UNIVERSITY of STRATHCLYDE
FRASER OF ALLANDER INSTITUTE

Modelling the Economic Impact of a Citizen's Basic Income in Scotland

Final Report

IPPR

Manchester Metropolitan University

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Section 1: Introduction

1.1 Background

The aim of this report is to provide an assessment of the economic impacts of introducing a Citizen's Basic Income (CBI) in Scotland.

It has been prepared by researchers at the Fraser of Allander Institute at the University of Strathclyde, Manchester Metropolitan University and IPPR Scotland.

In order to capture a realistic picture of the reality of a CBI in Scotland, we look at both the payment of the CBI itself, and the increase in tax that would be required to pay for it.

The assessment of how it may impact upon the economy is then put together by quantifying both the direct impact on people's incomes and, based on available evidence, the range of possible decisions and behaviours that may follow.

Modelling the potential economic implications of a CBI in Scotland is not straightforward.

Firstly, there is limited evidence from elsewhere – either internationally or locally – of the potential impacts of a substantial, permanent and unconditional CBI on economic, social and wider outcomes.

Secondly, introducing a CBI at scale is by definition an attempt to engineer major structural and economic change within society. We were explicitly tasked with modelling a significant CBI to best explore the avenues through which it may have an impact upon the economy[1].

How individuals, households, firms and the entire economy respond to such changes – not just in their own circumstances but the wider implications for society as a whole – is necessarily going to be more uncertain than smaller scale or marginal changes that we usually see in policymaking[2].

What is most important therefore to informing the debate on a CBI is to better understand the impact on household incomes, the cost of potential schemes, the positive and negative avenues through which it might impact upon the economy (such as incentives to work, the efficiency of the labour market and links to productivity), the scale of these impacts and the actions that government (and others) may take to create a supportive environment.

[1] Of course, smaller variations are entirely possible and in reality, might be part of a transition or gradual introduction of a CBI to manage some of the effects outlined below.

[2] See for example, the changes in the tax bands and tax rates implemented by the Scottish Government since the devolution of income tax in 2016.

The structure of our report is as follows.

In Section 2, we discuss the first stage in our modelling work – a microsimulation exercise – which aims to quantify the direct fiscal impacts of implementing a CBI in Scotland.

In Sections 3 and 4, we model the extent to which these fiscal changes may have an impact upon the wider economy – and in particular, through changing the economic incentives (both good and bad) that individuals face.

In Section 5, we bring this all together by combining the results from both our economic modelling with our fiscal modelling to highlight the potential long-term changes in the income distribution and key measures of inequality and poverty.

Section 6 provides a conclusion.

Alongside these sections, the report also contains a series of annexes.

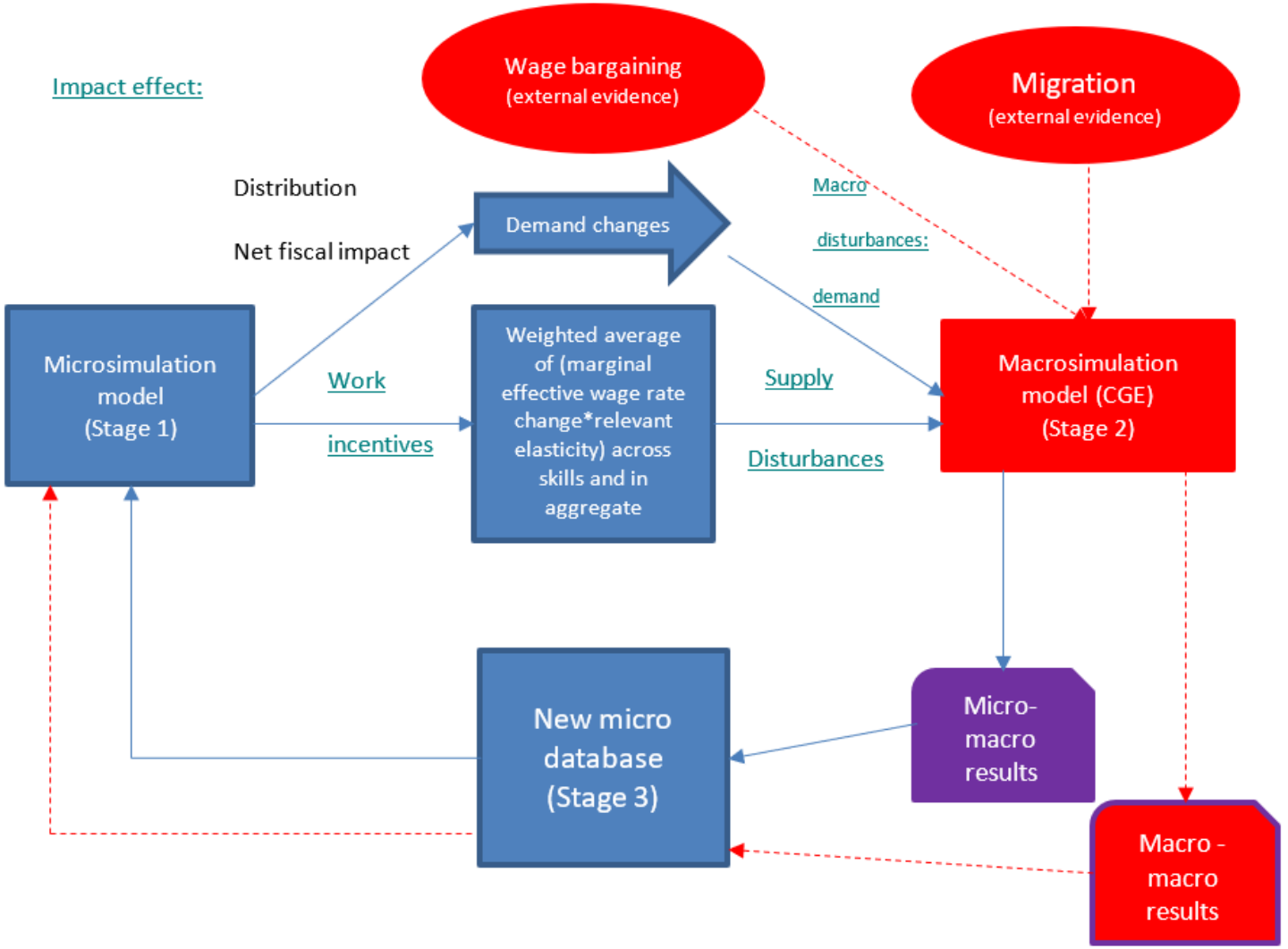
Before these sections however, we briefly discuss our methodology. The methods that we deploy are necessarily complex, with a host of different factors having an impact at any one time. This report is necessarily relatively long. The next section therefore provides a brief summary.

1.2 Our approach

To help shed light on some of the key issues that could arise should Scotland wish to introduce a CBI, we deploy a number of different analytical techniques.

These are summarised in the diagram below.

Figure 1.1 Summary of methodology



In Stage 1, we use a microsimulation model to estimate the likely gross fiscal cost of introducing a 'high' and 'low' CBI and the changes in income tax required to finance it. This stage of the analysis also provides a first-round assessment of the reduction in poverty and inequality that a CBI is designed to target before any changes in behaviour are considered.

In Stage 2, we consider how individuals, households and firms might respond to such a major change in fiscal policy by using an economic model of the Scottish economy. These models take the results from phase 1 and uses them to trace how our economy might perform over time, dependent upon a number of scenarios for how key aspects of our economy – most notably our labour market – might respond. Here we look at two approaches, one where individuals respond to changes in their wages in a more competitive market (micro-to-macro) and another where there is bargaining across the economy as a whole (macro-to-macro).

In Stage 3, we take the results from our long-run economic simulations – for example, changes in employment and wages) – to identify potential effects on the distribution of household incomes and measures of poverty. See Box 1 for a discussion of what we mean by 'long-term'.

Throughout we test for a number of different factors, such as changes in migration, skill levels and consumption patterns, that might impact upon any results.

Note that what we are not doing is providing a *forecast* for what the impact of a CBI 'will' be.

Rather our analytical approach is designed to shed light on the key avenues through which introducing a CBI *could* impact upon the Scottish economy; the underlying costs of different schemes; the likely scale of different effects; the potential positive and negative implications of different scenarios for how people/firms might respond; and most importantly, the types of behaviours that could drive particular outcomes.

This does of course mean that instead of providing a single point-estimate or a definitive positive or negative conclusion, we provide a range of outcomes each highlighting the possible scale and direction of travel under various assumptions and scenarios. In our view, this is a much more effective and transparent approach that avoids falling into a trap of believing that an *exact* outcome good or bad can be predicted for such a major and unprecedented policy.

This is especially important in our case given i) the scale of the change we have been asked to model and ii) the limited experience there is anywhere in the world of such a major structural change.

Box 1: Long-term results in our approach

The CBI policy involves a substantial redistribution of resources between people in the Scottish population. Because of varying propensities to purchase different types of goods and services, this redistribution changes the pattern of demand within the Scottish economy. Also, the new income tax regime changes incentives to work, which changes behaviour on the part of current or potential workers.

Firms respond to the changing pattern of demand for goods and services, and the changing pattern of labour supply from workers with decisions about investment and how many workers to employ. These decisions in turn create their own dynamic responses in the following period, creating a feedback loop. Eventually the feedback loop irons itself out and the economy settles down in a new, altered, state.

The macroeconomic model estimates these dynamic responses and traces the path through the first year's response to the policy and the feedback loops that occur in subsequent years. The point at which the feedback loops iron out and the model converges to a new, altered state of the economy, will depend on the degree and type of change being modelled.

Typically, within this project, the macroeconomic modelling refers to 15 to 20 years after the policy is introduced. In effect, this is when all the adjustments to the economy after the policy have settled down to its new 'altered' steady state.

1.3 What we find

What our results show is highly revealing, but also relatively intuitive.

Introducing a CBI at scale would necessarily imply a fundamental change in society that seeks to remove inequality and poverty.

For example, even the 'low' CBI policy option we have modelled costs around £27bn, rising to over double that in the case of a 'high' option[3]. This implies a substantial change to how much tax people pay, but also an unprecedented reduction in inequality and poverty.

[3] To put this in context, the Scottish Government's annual resource budget – to fund the NHS, police & fire, local government, environmental services, enterprise & skills, universities etc. – was £28.6bn in 2019-20.

Table 1.1 Citizens Basic Income Values in 2019/20[4]

Age band	Low-level CBI	High-level CBI
0 to 15	£84.54	£120.48
16 to 19	£84.54	£213.59
20 to 24	£57.90	£213.59
25 to below State Pension Age	£73.10	£213.59
State Pension Age or over	£163.00	£195.90

How society responds to such a fundamental change drives our analytical results.

We find a substantial reduction in poverty and inequality under all policy options. Although the reductions are 'expensive' in terms of gross fiscal cost. Other alternatives – just focussed upon poverty reduction and not any possible wider benefits of a CBI – are much cheaper.

Box 2: A note on terminology

In the report, we refer to the different policy choices on CBI – high, low, universal credit comparator – as *policy options* (for ease, labelled 1, 2 and 3 respectively).

In the modelling that follows to trace the impact upon the economy, we look at different *scenarios* for how the results might change according to different assumptions about key parameters in the underlying macroeconomic model.

[4] These figures are taken from Table 2.1

Table 1.2 Effects on Poverty[5]

Option	1		2	3
	Low-level CBI	*Illustration of low-level CBI after modelling macroeconomic effects*[6]	High-level CBI	Universal Credit comparator
Change in poverty (Base = 1,140,000)	**-280,000**	***-280,000***	**-910,000**	**-170,000**
Change in child poverty (Base = 270,000)	**-90,000**	***-80,000***	**-250,000**	**-100,000**
Change in poverty rate (Base = 21.6%)	-5.4 pp	*-3.3 pp*	-17.3 pp	-3.2 pp
Change in child poverty rate (Base = 28%)	-9 pp	*-6 pp*	-25 pp	-10 pp
Gross cost per person lifted out of poverty	£139,000	*n/a*	£87,000	£15,000
Gross cost per child lifted out of poverty	£293,000	*n/a*	£235,000	£10,000

We also find that the impacts on the economy whilst uncertain, have the potential to be hugely significant and would require careful management and implementation.

In short, to finance a CBI at scale requires a significant change to the tax system[7]. To illustrate this, we focus upon income tax. A CBI of the scale we have been asked to model, would require a change in the personal tax system across all parts of the income distribution. For example, a starting tax rate of over 30% rising to a top rate of tax of over 80% in the 'high' CBI policy option[8].

[5] These figures (unless otherwise noted) are taken from Table 2.4

[6] These figures are taken from Table 5.4: Bargaining 2 scenario (Wage bargaining adjusted for workers' CBI)

[7] For example, to put £27bn in context, total VAT revenues in Scotland are estimated at £11.1bn, corporation tax at £4.0bn and council tax at £2.4bn.

[8] It is possible to use another combination of tax changes – e.g. VAT, National Insurance, Corporation Tax etc. Whilst the exact effects would be different, the changes in incentives either within firms, households or individuals would be similar. Although it should be noted that a substantial increase in VAT is likely to be regressive on income, offsetting some of the more progressive elements that would come through on personal taxation.

Table 1.3: Costs and new income taxes rates required to achieve fiscal neutrality[9]

Option	1	2	3
	Low-level CBI	High-level CBI	Universal Credit comparator
Gross cost	**-£26.7 bn**	**-£57.8 bn**	**-£1.0 bn**
Savings from benefit reductions	£4.0 bn	£4.0 bn	£0.0 bn
Savings from state pension reduction	£6.3 bn	£6.6bn	£0.0 bn
Savings from PA abolition	£9.1 bn	£9.0 bn	£0.0 bn
Savings from tax rate rises	£7.2 bn	£38.3 bn	£0.9 bn
Net cost	**-£0.2 bn**	**£0.1 bn**	**£0.0 bn**
Income tax rate rises needed to achieve fiscal neutrality	+8 points on every band	+49 pts on band 3 +44 pts on band 4 +39 pts on 1,2,5	+6 points on top two bands
New Scottish income tax schedule[10]	27:28:29:49:54	58:59:70:85:85	19:20:21:47:52

One might expect that the response from individuals paying such higher tax rates, and who would see a significant shift in their absolute and relative income, would be such that the economy would be negatively impacted (even if there is a re-distribution within society).

Why? Some economists and policymakers will have concerns that tax increases on such a scale may drive up wage costs, weaken some incentives to work by reducing in-work income for the vast majority of people[11], increase some costs for firms, erode international competitiveness and have a negative impact upon traditional measures of economic performance such as GDP.

In our modelling, and under a number of key assumptions about how our economy operates, the combination of such pressures would see employment fall and unemployment rise[12] - see Table 1.4. In short, if these behaviours turned out to be the response to a CBI, then we can expect our economy to be smaller – in the long-run – as a result, and potentially significantly so.

[9] These figures are taken from Table 2.3

[10] Scottish Income Tax bands: Band 1: £1 to £2,049; Band 2: £2050 to £12,444; Band 3: £12,445 to £30,930; Band 4: £30,931 to £150,000: Band 5: £150,001 plus

[11] Note that the tax rate required for a CBI of this scale is such that the difference between in-work and out-of-work income (including all benefits) is smaller for the vast majority than at present.

[12] These 'standard assumptions' are based upon long-term evidence upon how individuals have reacted to changes in take-home income in the past. See Sections 3 and 4 for a discussion.

Of course, some will argue that any 'trade-off' between the size of the economy – as measured in terms of 'traditional' measures such as GDP or employment – and a reduction in inequality is worth it. A smaller economy relative to what it could have been but with greater equality might still be viewed as preferable by some if it better supports national wellbeing. It may also bring other 'benefits' such as a decline in emissions (at least those linked to growth).

But others will argue that a smaller economy may be bad for the country as a whole in the long-run[13].

Is it however, guaranteed that a CBI would lead to a smaller economy? Not necessarily. The risks to the economy in our modelling stem from those individuals now paying higher taxes responding negatively to a change in their total take-home income (even accounting for the fact that they too benefit from the CBI).

Table 1.4: Long run Impact of Low-level CBI [14]

	No Migration	Migration scenario
GDP (£m)	-4.4%	-15.2%
Real take home wage	-11.5%	-7.7%
Employment	-5.0%	-16.4%
Income Tax	87.3%	125.1%
Transfers to household from government	117.4%	117.4%
Consumption of lowest quintile	28.7%	23.7%

Some will argue that this mechanism may not hold. Firstly, it could be argued that people will not respond – or have the opportunity to respond – to a substantial increase in their tax take in the manner suggested above. But the evidence on such a view is limited, particularly over the long-run.

[13] This may be particularly important in an economy, like Scotland, with an ageing population with growth one avenue through which the care and support of an elderly population can be supported.

[14] Figures taken from Table 4.6 and 4.7 both which assume that workers take the impact of the CBI on their own incomes fully into account. The migration scenario imposes a tight constraint, which implies that out-migration continues until the real personal disposable incomes of workers and unemployment rates return to their original levels, restoring differentials with the rest-of-the UK.

Secondly, it could be the case that the introduction of a CBI may have positive impacts upon labour supply efficiencies. For example, by removing the 'cliff-edge' in returns to work that some people, particularly on relatively low incomes, often face[15].

Thirdly, and most importantly, if society's preferences are such that people are willing to pay higher taxes in exchange for a significant reduction in inequality across society, or to put in another way if people support the idea of a 'social contract', then the response may not be as stark.

How much might this offset (and might it be sufficient to fully offset any behavioural change)? This is clearly another uncertainty, not in terms of economic modelling but in terms of societal attitudes and socio-economic preferences.

Our analysis does not take a view on which argument is correct, instead it simply highlights the possibility for a trade-off to exist.

What we can say is that, given the scale of the tax increases required, it would require a high level of support for a CBI right across all sections of society (and a commitment to pay for it). The stronger the support for a CBI, then the stronger these effects will be.

Finally, it is possible to argue that a CBI might not just impact upon labour market incentives, but may also have implications for productivity.

A CBI may boost productivity if it led to improved health and social outcomes for workers, which in turn contributes to worker productivity and reduces absenteeism. At the same time, it may also free up government resources to invest in skills, education and infrastructure which will have their own positive impacts upon productivity and employability in the long-run.

But should costs rise and competitiveness fall, then any change to productivity may be in the opposite direction if it limits investment and human capital development. If the economy is smaller, this may limit the amount of government resources that can be raised to support investment.

Unfortunately, at this point in time there is limited empirical evidence that we are aware of that has been able to systemically test for any links between productivity and the introduction of a CBI, at least at the scale being modelled here.

[15] Whilst this is an impact for a large number of people in the economy, from a macroeconomic perspective the cumulative impact – whilst important – is unlikely to be the most important factor driving the results. Instead it will be the impacts on the population as a whole.

1.4 Summary

These results reveal a crucially important conclusion from our analysis.

Introducing a substantial, permanent and unconditional CBI will require a massive fiscal effort by Scottish taxpayers, in exchange for a significant reduction in inequality. If a future government wished to consider introducing a CBI at scale, then to avoid any negative economic impact, it will need to ensure that society as a whole is ready for such an initiative, is fully supportive for what it is trying to achieve, and has people ready and willing to pay to see it happen.

The sections that follow describe our methods and the key results.

Section 2: Microsimulation modelling of a Citizens Basic Income for Scotland

2.1 Methodology

Estimation of the first-order effects of two Citizens Basic Income (CBI) policies, and a comparator policy, were carried out using the Institute for Public Policy Research (IPPR) Tax-Benefit Model.

This is a tax-benefit microsimulation model used by five organisations for short-term forecasting of the distribution of income and for estimating the effects of tax and benefit policy change. The users of the model are the Institute of Public Policy Research, the Resolution Foundation, the Joseph Rowntree Foundation, the New Economics Foundation and the Legatum Institute. For an example of a recent publication using the model, see Resolution Foundation's *Living Standards Outlook 2019*.[16]

The model takes a recent population sample from a survey of household incomes and uprates financial values in the data from the survey date of interview to April in the chosen policy year so that the sample represents a forecast of the sample for that year.

Typically, values are uprated in line with a relevant Office for Budget Responsibility (OBR) forecast series. In some cases, a specific OBR series was not available so another was chosen as a suitable proxy.

2.2 Tax-benefit simulation

The model then simulates taxes and benefits for each member of the sample in the policy year, going through each tax and benefit one-by-one.

First non-means-tested benefits are estimated, then income tax, national insurance and council tax and, finally, means-tested benefits. Whilst the simulation of non-means-tested benefits and income taxes takes place mostly at the level of the individual, means-tested

[16] For example, see Corlett (2019), *The Living Standards Outlook 2019*, Resolution Foundation

benefits are simulated at the level of the benefit unit – single adults or adults in a couple plus their dependent children[17] – which is the unit used by the state to assess benefits.[18]

2.2.1 Benefit take-up

Each means-tested benefit is also subject to a take-up simulation, based on an econometric equation of take-up and a monte carlo simulation, aligned to aggregate take-up statistics.

Built into the model is a probit equation of take-up of each benefit conditional on entitlement.

Once entitlement is established during each run of the model, the equation is used to estimate a probability of take-up. Uniform random numbers are drawn for each benefit unit, who are then ranked in order of the difference between their random number and take-up probability.

Aggregate alignment totals of the proportion of the entitled population who take up each benefit are then used to select the required number of benefit units as taking up the benefit. Those who are not selected are recorded as receiving no income for that benefit.

2.2.2 Calculation of results

The model is run for a base case consisting of unchanged policy and chosen policy reform options.

Net income is calculated in each case and the difference between a given reform option and the base case represents the effect of that reform on each sample member's net income. Because net change is available for each household and benefit unit, it is possible to estimate the number of gainers and losers, and to look at average gains at different points in the income distribution, or for sub-groups of the population.

Given that the model produces an estimate of net income for every member of the sample, it is also possible to estimate the number of people or children in poverty in each policy option, including the base case, thereby allowing an estimate of the effect of each reform on poverty and child poverty. However, poverty estimates are calibrated to ensure they are consistent with the latest official poverty statistics.

[17] Dependent children are those aged up to 16 or those aged up to 19 and in full-time education

[18] Thus, households can contain more than one benefit unit. For example, a household containing a couple plus two school-age children, one 20-year-old child, and a grandparent, contains three benefit units: one containing the couple and school-age children, one containing the grandparent and one containing the 20-year-old.

Finally, by aggregating across all members of the sample, the aggregate net costs of the reform can be estimated. The Department for Work and Pensions runs a similar model – the Policy Simulation Model – and it uses exactly this method for estimating the likely fiscal costs and savings from all proposed changes to benefit rates.

2.3 Data and modelling approach

2.3.1 Model data

The model uses data from the Family Resources Survey (FRS) – a UK-wide household survey of family incomes with a sample size of 19,105 households in the latest 2017/18 wave.

There is a boosted sample for Scotland, so there are 2,766 Scottish households with an average grossing factor of 890 compared to 16,339 households in the rest of the UK with an average grossing factor of 1,540.

In order to enlarge the sample further for Scotland-specific analysis, the modelling for this project was carried out using a pooled dataset of the last three years of the FRS: 2015/16, 2016/17 and 2017/18.

The total sample of Scottish households across these years was 8,259.

2.3.2 Policy year

The modelling was carried out using a policy year of 2023/24: i.e. all results are presented as if the chosen policies were implemented in that year.

No demographic adjustment was made to weighting variables to take into account population change, so the results are presented as if the population is unchanged between 2017/18.

This means that fiscal costs and estimates of changes in poverty are directly attributable to policy change, rather than because the size of the population might have changed.

2.3.3 Uprating

The FRS is a continuous survey – households are surveyed throughout the year. So financial values in our starting sample were uprated from the month of interview to a target date of April 2023 – the start of our chosen policy year.

Earnings, private pension income, other unearned income and pension contributions were uprated in line with the OBR quarterly average earnings growth forecast;[19] childcare, home insurance and water & sewerage costs in line with the OBR Consumer Prices Index forecast; and local authority, housing association and private rented sector rents in line with the relevant OBR eligible rent growth assumptions.

2.4 Tax and benefit assumptions

In the modelling, the two CBI policies and the comparator policy were compared against a base case which consisted of all currently-announced policies at the time that the modelling commenced. Due to the timing of this work, the Scottish Child Payment was not included in the base case.

In the base case, tax thresholds and benefit amounts were set to their expected 2023/24 levels. These are constructed from currently announced government policy and a default assumption for uprating each threshold/amount.

For example, beyond currently announced values for the Income Tax Personal Allowance, its value was assumed to rise in line with the OBR forecast of the Consumer Price Index. Similarly, beyond the four-year length of the benefit freeze, benefit amounts were assumed to rise in line with the previous September's Consumer Price Index. The 'triple lock' was used for state pensions.

For Income Tax and Council Tax, Scotland-specific bands, thresholds and rates were used for Scottish households in line with current policy.

We also assumed that Universal Credit had fully replaced legacy benefits by the time of our chosen policy year, 2023-24. This was to enable the modelling results to show the pure effects of the CBI compared to Universal Credit rather than some aspects of the results actually showing the effects of the transition from legacy benefits to Universal Credit.

2.4.1 Citizens Basic Income options

We tested two version of the Citizens Basic Income: a low-level version based on benefit levels[20] and a high-level version based on the level of the Joseph Rowntree Foundation

[19] OBR (2019), *Economic and Fiscal Outlook Supplementary Economic Tables*, March 2019

[20] Note that the pensioner rate of £163 per week is slightly less than the rate of the Pension Credit Guarantee Credit (£167.25) and the rate of the New State Pension (£168.60).

Minimum Income Standard.[21] The 2019/20 values of the two versions are shown in the table. These values were uprated in line with the OBR Consumer Price Index forecast to 2023/24.

Table 2.1: Citizens Basic Income values in 2019/20

Age band	Low-level CBI	High-level CBI
0 to 15	84.54	120.48
16 to 19	84.54	213.59
20 to 24	57.90	213.59
25 to below State Pension Age	73.10	213.59
State Pension Age or over	163.00	195.90

2.4.2 Tax and benefit changes

With both CBI policy options, we assumed that the following tax and benefit changes would be made as part of the introduction of the policy:

Table 1.2: Tax and benefits changes when CBI applies

Benefit	Approach for benefit units subject to the CBI
Carers Allowance	Set to zero
Child Benefit	Set to zero
State Pension	Reduced by the value of the person's CBI (Set to zero if their CBI is greater than their State Pension)
Pension Credit	Set to zero
Universal Credit Adult Element	Element set to zero
Universal Credit Child Element	Element set to zero
Income Tax Personal Allowance	Set to zero

Note that in our modelling, the CBI was **not** replacing those elements of Universal Credit designed to help with housing and childcare costs or the elements that provide additional support for families containing disabled adults or children.

[21] See https://www.jrf.org.uk/report/minimum-income-standard-uk-2019 for more details on the JRF Minimum Income Standard

So, under the CBI reform options, Universal Credit still existed, but could only go to those paying rent or childcare costs, or with disabled people in the family, whose incomes were sufficiently low to be eligible. In technical terms, the standard adult and child elements were set to zero but the rest of the benefit was left unchanged.

A core assumption was that each reform option should be fiscally neutral: that the net costs of the policy should be close to zero. In the case of the Citizens Basic Income options, after the policies themselves were introduced, and the above benefit and tax changes were made, there remained a fiscal cost. To remove this, we then increased income tax rates (by whole percentage points) until we reached fiscal neutrality.

We imposed a limit on income tax rates for each band of 85 per cent. We also tried as far as possible to increase income tax rates by no more in lower tax bands than in higher tax bands. However, in the case of the high-level CBI, these two restrictions meant that we could not achieve fiscal neutrality and so were forced to increase bands 3 and 4 by more than band 5.

Also, for ease of presentation and discussion, we kept all income tax rate rises to whole percentage points. To accommodate this restriction, we treated any final net cost of within £300 million per annum of zero as being effectively cost neutral.

2.4.3 Universal Credit comparator policy

We also tested a comparator policy which involved not introducing a CBI but instead making changes to current benefits and was designed to maximise the impact on child poverty.

In this comparator policy, we abolished the two-child limit for Universal Credit, abolished the Benefit Cap, and increased the second and subsequent child element of Universal Credit by £40 per week in 2019/20. The first child element was then set to the new, higher, second and subsequent child element. These amounts were then uprated in line with the OBR Consumer Prices Index forecast to 2023/24.

With this policy option, because the gross costs were lower, there was no need to make wide-ranging changes to taxes and benefits to achieve fiscal neutrality: the only changes that were needed were to increase income tax rates for the top two bands of the Scottish Income Tax system.

2.4.4 Geographical scope

The modelling was carried out using the whole UK-wide dataset (57,807 households), with any policy changes (whether for the CBI or the comparator policy) applied only to the 8,259

households in Scotland. Sample households from the rest of the UK were assumed to face the base case policy option.

2.5 Key results

In the results below, the policy options are labelled as follows:

Table 2.2: Policy Option codes

1	Low-level CBI
2	High-level CBI
3	Universal Credit comparator policy

2.5.1 Costs and income tax rate rises

The table below shows the gross cost of introducing each policy, how much is saved from the benefit changes listed in Table 1 (apart from reducing the state pension), from reducing the state pension, from abolishing the Income Tax Personal Allowance, and finally from raising income tax rates by enough to achieve fiscal neutrality.[22]

Because of the intention to achieve fiscal neutrality, the net cost of each option is close to zero.

[22] As noted above, due to the timing of this work, the Scottish Child Payment is not included in any of the three reform scenarios, or in the baseline scenario to which they are compared.

Table 2.3: Costs and new income tax rates required to achieve fiscal neutrality

Option	1	2	3
	Low-level CBI	High-level CBI	Universal Credit comparator
Gross cost	**-£26.7 bn**	**-£57.8 bn**	**-£1.0 bn**
Savings from benefit reductions	£4.0 bn	£4.0 bn	£0.0 bn
Savings from state pension reduction	£6.3 bn	£6.6 bn	£0.0 bn
Savings from PA abolition	£9.1 bn	£9.0 bn	£0.0 bn
Savings from tax rate rises	£7.2 bn	£38.3 bn	£0.9 bn
Net cost	**-£0.2 bn**	**£0.1 bn**	**£0.0 bn**
Income tax rate rises needed to achieve fiscal neutrality	+8 points on every band	+49 pts on band 3 +44 pts on band 4 +39 pts on 1,2,5	+6 points on top two bands
New Scottish income tax schedule[23]	27:28:29:49:54	58:59:70:85:85	19:20:21:47:52

2.5.2 *Poverty*

Table 2.5 shows the effect of each policy on poverty.

Note that these results show the effects on poverty assuming a fixed UK-wide poverty line using the After-Housing Costs measure and a poverty threshold of 60% of median equivalised weekly household income.

The UK-wide poverty line is used because that is the basis for the Scottish Government's poverty targets and poverty statistics.

When modelling the effects of a policy reform on poverty, it is possible for the reform itself to move the poverty line if median incomes change as a result of the reform. One can either report the post-reform level of poverty against the new poverty line or against a fixed, unchanged poverty line.

In this case, the introduction of a CBI in Scotland would have some effect on UK-wide median income, and therefore on the UK-wide poverty line. However, the effect would not be great because the population of Scotland is less than 10% of that of the whole of the UK. So there is not too much difference between the poverty results using a fixed UK-wide poverty line and a floating UK-wide poverty line.

Figures are shown separately for the change in people in poverty, and in children in poverty.

[23] Scottish Income Tax bands: Band 1: £1 to £2,049; Band 2: £2050 to £12,444; Band 3: £12,445 to £30,930; Band 4: £30,931 to £150,000: Band 5: £150,001 plus

Finally, the table shows the gross cost per person and per child lifted out of poverty. This is a standard metric for assessing the efficiency with which a policy reduces poverty (or child poverty): the lower the cost per person (or child) lifted out of poverty, the more efficient the policy.

Table 2.4: Effects on poverty

Option	1	2	3
	Low-level CBI	High-level CBI	Universal Credit comparator
Change in poverty (Base = 1,140,000)	**-280,000**	**-910,000**	**-170,000**
Change in child poverty (Base = 270,000)	**-90,000**	**-250,000**	**-100,000**
Change in poverty rate (Base = 21.6%)	-5.4 pp	-17.3 pp	-3.2 pp
Change in child poverty rate (Base = 28%)	-9 pp	-25 pp	-10 pp
Gross cost per person lifted out of poverty	£139,000	£87,000	£15,000
Gross cost per child lifted out of poverty	£293,000	£235,000	£10,000

2.5.3 *Distributional* effects

The table below shows the average change in weekly benefit unit income[24] for people in each quintile of the income distribution in the base case.

Note that this shows the average amongst all people (not amongst all benefit units).

Table 2.5: Change in weekly benefit unit income (rounded to nearest £)

Option	1	2	3
	Low-level CBI	High-level CBI	Universal Credit comparator
	Average change in weekly benefit unit income		
All people	**£13 pw**	**£7 pw**	**£6 pw**
People in bottom quintile	£71 pw	£269 pw	£31 pw
People in 2nd quintile	£56 pw	£199 pw	£31 pw
People in middle quintile	£36 pw	£99 pw	£7 pw
People in 4th quintile	£3 pw	-£47 pw	-£2 pw
People in top quintile	-£102 pw	-£499 pw	-£40 pw

[24] A benefit unit is a single adult or adult couple plus their children aged up to 16, or up to 19 if in full-time education.

2.5.4 Gainers and losers

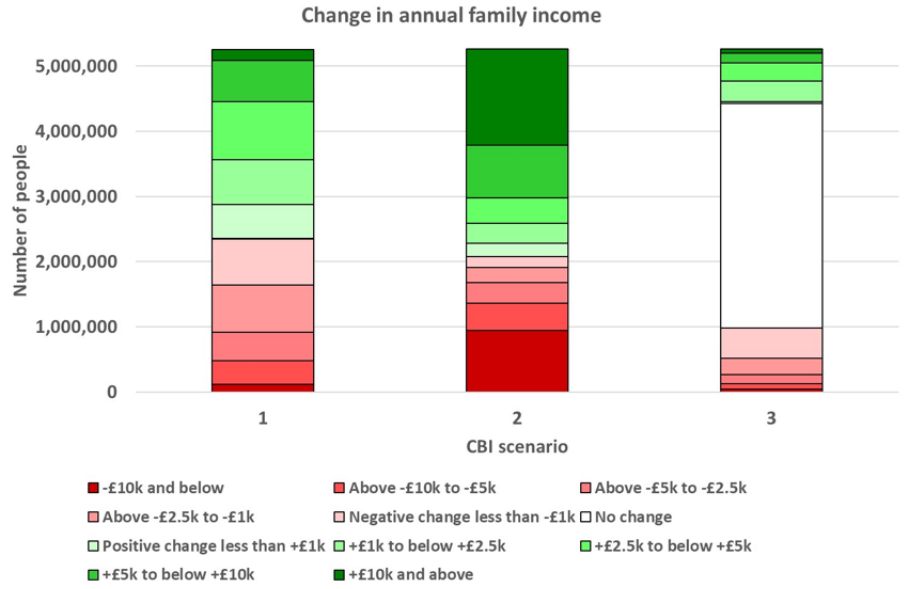
The table shows how many people in each quintile of the base case income distribution see an increase or a decrease in their benefit unit income.

Table 2.7: Number of gainers and losers (rounded to nearest 10,000)

Option	1	2	3
	Low-level CBI	High-level CBI	Universal Credit comparator
		Gainers	
All people	**2,900,000**	**3,180,000**	**830,000**
People in bottom quintile	940,000	1,040,000	280,000
People in 2nd quintile	780,000	990,000	390,000
People in middle quintile	650,000	830,000	130,000
People in 4th quintile	420,000	310,000	30,000
People in top quintile	100,000	10,000	0,000
		Losers	
All people	**2,360,000**	**2,080,000**	**970,000**
People in bottom quintile	100,000	0,000	0,000
People in 2nd quintile	270,000	60,000	10,000
People in middle quintile	400,000	230,000	70,000
People in 4th quintile	680,000	780,000	210,000
People in top quintile	920,000	1,010,000	680,000

How many people experience different levels of gain or loss in benefit unit income?

Figure 2.1: Change in annual benefit unit income



Source: MMU

2.6 Discussion

2.6.1 Costs and tax rate rises

The gross costs for the low-level and high-level Citizens Basic Income are £26.7 billion per annum and £57.8 billion per annum respectively. By way of comparison, total Scottish Government expenditure in 2018/19 was £42.9 billion. So, this is a policy where the volume of expenditure would be larger than any previous item of activity by the Scottish Government.

The removal of all of the benefits identified in Table 1, except for the State Pension reductions, would save £4 billion per annum. The savings from the State Pension reductions are very slightly higher in the case of the high-level CBI because the approach taken was to reduce each person's State Pension by the amount of their CBI. With a higher CBI, this means that some people have a higher reduction.

There is an interaction between reducing the State Pension and abolishing the Personal Allowance for Income tax because the State Pension is taxable. Abolishing the State Pension creates savings from reduced outgoings but also a reduction in Income Tax receipts. The effects shown in each stage of Table 2.3 show the net effects taking into account offsetting changes in other parts of the system.

The net annual costs of introducing the CBI, reducing the specified benefits, reducing the State Pension and abolishing the Income Tax Personal Allowance are £7.3 billion in the case

of the low-level CBI and £38.2 billion for the high-level version. In order to deliver fiscal neutrality, these are the amounts that it is necessary to raise through increases in income tax rates.

In the case of the low-level CBI, an 8 point across-the-board increase in income tax rates is sufficient to make up almost all of the outstanding cost. For the high-level CBI, it was not possible to deliver fiscal neutrality with an across-the-board increase in tax rates without pushing the highest rates above 85 per cent. Thus, we settled on an Income Tax structure whereby bands 3 and 4 increase by slightly more than band 5.

It is important to note that these Income Tax rates apply to all income – there is no Personal Allowance. So, under the low-level CBI, the very first pound of earnings will be taxed at 27 per cent, and earnings from £30,930 upwards[25] would be taxed at 49 per cent.

Comparing the two CBI options with the Universal Credit comparator, it is clear that this policy comes at a substantially lower cost. The gross cost of £1.0 billion per annum can be recovered by raising income tax rates on only the top two Scottish Income Tax bands by 6 percentage points.

2.6.2 Poverty

The low-level CBI reduces the number of people in poverty by about a quarter and the number of children in poverty by about a third. Unsurprisingly, the high-level CBI has a much greater impact on poverty, reducing the number of people by around 80% and the number of children by nearly 90%.

Because the comparator Universal Credit policy was designed to be most effective at reducing the number of children in poverty, it is more effective at doing that than in reducing overall poverty numbers.

In fact, it takes more children out of poverty than the low-level CBI, and at a substantially lower cost. Its cost-per-child lifted out of poverty is only £10,000 compared to nearly £300,000 for the low-level CBI, which makes the low-level CBI a very inefficient way of reducing child poverty.

The implication is that, if reducing poverty directly is the principal objective, there are more effective ways of doing so than a Citizens Basic Income.

[25] £30,930 is the figure for 2019/20. By 2023/24, this threshold would be expected to rise to just over £33,000.

2.6.3 Distributional effects

In all three policies, the shape of the distributional effects is similar: the largest gains go to people at the bottom of the income distribution and the bill is paid by people at the top. The main difference between the options is the scale of change.

In the high-level CBI, the average gains to people in the bottom quintile are substantial: at £269 per week, or around £14,000 per year. On the other hand, people in the top quintile stand to lose on average around £26,000 per year.

With the low-level CBI, the average gains in the bottom quintile are around £3,700 per year whilst average losses in the top quintile are around £5,300 per year.

As a more targeted policy, the Universal Credit comparator affects fewer people and so the average effects are smaller: +£1,600 in the bottom two quintiles and -£2,000 in the top quintile.

2.6.4 Gainers and losers

Figure 2.1 shows the results for gains and losses in a slightly different way, bringing out how many people are gaining and losing by different amounts.

What is striking from this chart is that both CBI options are policies in which virtually no-one is unaffected. Almost *everyone* either gains or loses from the policy.

There are also quite large numbers of people who gain or lose by substantial amounts. In the low-level CBI, 1.7 million people will see their benefit unit income go up by at least £2,500 per annum, and nearly a million will see a fall of at least that much.

This is in quite clear contrast the Universal Credit comparator policy, where two-thirds of people are unaffected by the policy. Amongst the remainder, the numbers affected substantially are quite small.

2.7 Conclusions

The high-level CBI involves costs that are so substantial that it is very difficult to recover them through the income tax system.

Fiscal neutrality requires income tax rates of 70 per cent on income above £12,444, and 85 per cent on all income above £30,930.

Concentrating on the low-level CBI, very few people will be neutral about the policy – most people will see their incomes go up or down, some quite substantially.

The policy will certainly be redistributive, shifting money from the better off to the least well off. However, it does so in quite an untargeted manner. If the objective is specifically to directly reduce poverty, these results suggest that there are more efficient ways of doing so.

In Sections 3 and 4, we turn our attention to the knock-on impacts of such changes to the economy.

In Section 3, we focus solely on a labour supply effect – a so-called micro-to-micro approach – using various labour supply elasticities.

In Section 4, we look at the macroeconomy as a whole, including capturing the strength of wage bargaining effects at a national level.

Section 3: Modelling labour supply responses to changes in financial work incentives

3.1 Introduction: concepts and definitions

The previous section examined the financial implication of various CBI policies for households in different parts of the income distribution.

The analysis was 'static' in the sense that it assumed that people would not change their behaviour at all in the face of changes to their financial circumstances.

Whilst it is important to capture the scale of any 'immediate' impact through this channel, over the medium to longer-term this is likely to be an unreasonable assumption, particularly for those households who would see large changes in their financial circumstances following the introduction of a CBI. Indeed, the previous section showed that, whilst a CBI would directly (and unconditionally) increase household incomes, the funding of the CBI policy options would require increases in rates of income taxation that are likely to be significant for some individuals.

The aim of this section is to consider how the changes in *financial work incentives* induced by different CBI policies might lead to changes in the labour market behaviour of individuals. For example, to what extent might people be encouraged to work more as a result of the changes in their financial status following the CBI's introduction, and to what extent might they choose to work less to undertake more non-work activity – whether that related to leisure, caring or anything else?

In broad terms, our approach involves two key stages:

- First, we calculate the change in various measures of the financial incentive to work as a result of each proposed CBI policy, for each individual in our microsimulation model;
- Second, we make assumptions – based on evidence from existing research – about how individuals' labour market participation decisions might respond to a given change in financial incentive, based on the particular characteristics of those individuals.

We set out the methodology in further detail in subsequent sections.

The estimation of potential labour supply responses is of course subject to various uncertainties. We undertake sensitivity analysis by modelling a range of different

assumptions about the degree of responsiveness to financial work incentives, and we discuss the limitations and uncertainties of the results in the concluding section.

Before proceeding, it is useful to set out a few concepts that are critical to the understanding of the discussion.

First, there are two ways in which an individual's labour supply decision might change following a change in financial work incentive:

- Changes in financial incentive can influence the decision over whether to work at all or not. This is the so-called *extensive margin* of response.
- Financial incentives can also influence the decision over how much to work, i.e. how many hours to work. This is the so-called *intensive margin* of response.

Note that there are other ways that individuals might respond to changes in taxation or benefits policy. In particular, some individuals may be able to vary their taxable income without necessarily varying their labour supply decision (for example, an increase in income taxation might induce some people to make greater use of tax reliefs, or incentivise the self-employed to incorporate in order to take income in the form of dividends that are taxed at a lower rate). In this analysis, we focus on labour supply responses rather than the responsiveness of taxable income.

Second, a change in labour supply following a change in the financial incentive to work encompasses two sorts of effects: substitution effects and income effects.

- *Substitution effects* relate to the financial reward of working relative to not working. If somebody's marginal tax rate increases, the reward to them of working an extra hour relative to taking an hour of 'leisure' diminishes. Similarly, a tax or benefit change which reduces the reward of working relative to not-working may influence some people's decision over whether or not to work at all.
- But as well as caring about the rewards of working relative to not-working, people also care about income in its own right. This is the *income effect*.

Thus, while substitution effects measure the reward from work, income effects measure the need to work.

Income effects and substitution effects tend to work in opposite directions in influencing labour supply responses to a tax or benefit change.

Economic theory cannot say anything about whether the income or substitution effects are larger, nor indeed how the income and substitution effects might differ across individuals. These are purely empirical questions, and we discuss evidence of relative magnitudes.

3.2 Methodology

Our methodology builds on an approach developed by the Institute for Fiscal Studies (Adam and Phillips, 2013) to estimate, ex ante, the potential labour supply response to a change in tax/benefit policy.

The Adam and Phillips (2013) paper assesses the possible labour supply effects of the introduction of Universal Credit in Wales. It is the only paper we are aware of that uses a microsimulation model to simulate labour supply effects across different types of individual and household.

The Adam and Phillips methodology involves two broad stages. First, they estimate the change in financial work incentive faced by each individual in a microsimulation model. Second, they make a set of assumptions about how responsive each individual is likely to be to the change in financial incentive that they face. By aggregating up, the methodology can be used to estimate the response across the entire population.

Adam and Phillips estimate both the intensive and extensive margins. But they only consider the substitution effect. The justification for ignoring income effects is twofold: it is justified partly on the grounds that empirical evidence suggests that income effects are small; and partly on the grounds that the policy change examined is one that is revenue neutral, and thus at an aggregate level income changes must net to zero.

In considering the potential labour supply responses to a CBI the case for assuming income effects away completely is less justifiable, not least because of the large changes to household income that are seen under some of proposed CBI policies.

We start by outlining the Adam and Phillips approach to estimating the substitution effect, before describing how we have broadened this approach to encompass income effects.

3.2.1 Estimating substitution effects: the Adam and Phillips approach

For both the extensive margin (the decision whether or not to work at all) and the intensive margin (how much to work), there are two stages. First, measure how much the financial incentive to be in work (or to work a bit more) changes. Second, based on an assumed estimate of how responsive individuals (of given characteristics) are, calculate the likely change in labour supply for all individuals who are in employment in the base case.

The financial incentive on the extensive margin (whether to work or not) is measured by the Participation Tax Rate (PTR). The PTR measures the 'gain-to-work', the proportion of total earnings taken in tax and withdrawn benefits, and is given by:

$$PTR = 1 - \frac{Net\ income\ in\ work - net\ income\ out\ of\ work}{Gross\ earnings}$$

The higher the number, the weaker the financial incentive to be in work. A PTR of 0.9 would imply that 90% of an individual's gross earnings are taken in tax and withdrawn earnings.

The approach adopted by Adam and Phillips is to model changes in employment decisions by adjusting the weights of all working individuals in their model by a factor p_i given by:

$$p_i = \left(\frac{1 - PTR_i^1}{1 - PTR_i^0}\right)^{\delta_i}$$

Where PTR_i^0 and PTR_i^1 are the PTRs faced by individual i under the baseline and post-reform options respectively, and δ_i is the elasticity of employment with respect to (1-PTR_i). The elasticity is a measure of how responsive an individual is to changes in their financial incentives, with a higher elasticity implying higher responsiveness. We discuss the choice of elasticities subsequently.

To illustrate, consider the practical example in Table 3.1. A worker faces a pre-reform PTR of 0.4. The reform has the effect of reducing the worker's in-work net income, to the extent that the PTR increases to 0.5 (the incentive to be in-work relative to not in work has worsened).

With an assumed employment elasticity of 0.15, the weighting factor is calculated to be 0.97. In other words, the weight attached to individual i declines by 3%. The weight attached to non-working individuals with the same characteristics is increased to ensure that the total population remains unchanged, albeit with a lower employment rate.

Table 3.1: Hypothetical illustration of the reweighting methodology

	Net income in work	Net income out of work	Gross earnings	PTR	Elasticity (δ_i)	Re-weight factor (p_i)
Pre-reform	80	20	100	0.4	0.15	.97
Post-reform	70	20	100	0.5		

The financial incentive on the intensive margin (how much to work) is measured by the marginal effective tax rate (METR), the proportion of a small increase in earnings taken in tax and/or withdrawn benefits. Again, a larger number implies weaker work incentives: a METR

of 0.6 implies that, if an individual worked an extra hour, 60% of their additional pay would be taken in tax or withdrawn earnings.

Adam and Phillips model changes in labour supply decisions on the intensive margin by adjusting the income of individuals in the sample as follows:

$$z_i^1 \;\; = \; z_i^0 \cdot \left(\frac{1-\tau_i^1}{1-\tau_i^0}\right)^{\gamma_i}$$

Where z_i^0 and z_i^1 is income under the pre- and post-reform policy, τ_i^0 and τ_i^1 are the METR faced by individual i under the pre and post reform policies, and γ_i is the elasticity (i.e. sensitivity) of hours of work with respect to 1-τ.

Again, a practical example may help illustrate.

Imagine an employee works 20 hours a week under a baseline policy, and faces a METR of 30%. Following a policy change, the employee's METR increases to 35%. If the individual's elasticity of hours with respect to the METR is 0.16, then after the policy reform their assumed hours are 20 x ((1-0.35/1-.03))^0.16 = 19.8. On an individual basis it clearly does not make sense to say that an employee would reduce their hours worked by 0.2 hours, but aggregated over all individuals with similar characteristics the calculation provides an estimate of the total change on the intensive margin.

We adopt the same approach as Adam and Phillips to modelling labour supply decisions on the extensive margin. We adopt largely the same approach to modelling labour supply decisions on the intensive margin, with one difference: rather than measure the responsiveness of income, we measure the responsiveness of hours worked. This difference does imply some differences in the choice of elasticity, discussed below.

3.2.2 Incorporating income effects into the analysis

We have adopted a simple, pragmatic approach to extend Adam and Phillips' methodology to incorporate income effects.

To measure the labour supply response on the extensive margin, we adjust the weight attached to employed individuals by a factor p_i given by:

$$p_i = \left(\frac{1-PTR_i^1}{1-PTR_i^0}\right)^{\delta_i} \cdot \left(\frac{y_i^1}{y_i^0}\right)^{\sigma_i}$$

The first part of the expression measures the substitution effect as defined by Adam and Phillips and discussed above. The second part of the expression measures the income effect,

by applying an assumed elasticity (i.e. measure of responsiveness) σ_i to the change in benefit unit net disposable income between the base case y_i^0 and policy option, y_i^1.

The labour supply response on the intensive margin for an individual working hours $z_i^0 > 0$ under the baseline is given by:

$$z_i^1 \;\; = \; z_i^0 \cdot \left(\frac{1-\tau_i^1}{1-\tau_i^0}\right)^{\gamma_i} \cdot \left(\frac{y_i^1}{y_i^0}\right)^{\varphi_i}$$

Where hours worked under the pre-reform policy (z_i^0) are multiplied by a term designed to capture substitution effects and a second term designed to capture income effects. The expression for the substitution effect is taken from Adam and Phillips as discussed above. The expression for income effects applies an assumed elasticity φ_i to the change in benefit unit net disposable income between the base y_i^0 and policy, y_i^1.

3.2.3 What does the evidence say about how responsive people are to changes in financial work incentives?

The previous section set out an overall approach to simulating the potential labour supply response to the introduction of a CBI. But to operationalise the approach we need to make assumptions about the likely size of the elasticities.

Of course, the degree of responsiveness is likely to vary significantly from individual to individual based on their preferences and circumstances. We cannot hope to incorporate a specific elasticity for each individual. But we can draw on empirical evidence to make broad assumptions about the likely size of these elasticities across groups – where groups are defined based on income, age and family circumstances.

There is a large literature on empirical estimates of labour supply elasticities. It is beyond the scope of this report to undertake a comprehensive and systematic review. But we can make a number of points and draw some general conclusions from this literature.

First, some caveats and limitations.

It is important to note that there are few if any studies which provide empirical estimates of labour supply responses to a large-scale policy change comparable to those modelled in this report, anywhere in the world – most empirical estimates are derived from relatively small changes to policy which affect a relatively narrow range of groups.

Furthermore, there are also relatively few studies which provide empirical estimates of labour supply responses in a directly comparable labour market setting, whether in terms of the geographical coverage, the time period of study, or the institutional framework. Thus

whilst there exist many empirical estimates of labour supply elasticities of one form or another, the transferability to the analysis of a specific CBI policy in Scotland is less strong.

As a result, there is a degree of uncertainty of how responsive people in Scotland would be to changes in induced by a Scotland-specific CBI policy.

That said, a degree of consensus does exist around the relative magnitude of response to changes in financial work incentives across workers with different characteristics (Adam and Phillips, 2013; Meghir and Phillips, 2009). For example, in terms of substitution effects, the following conclusions can be drawn:

- Among men, the decision of whether or not to work is more responsive among those with low education than those with high levels of education.
- For highly educated and wealthy men, taxes have little effect on the decision whether to work or not, nor how many hours are worked per week or per year. But taxes do affect these men's total as well as taxable income through less quantifiable 'work effort' and tax avoidance.
- For low education men, it has typically been assumed that tax and benefit incentives affect the participation decision, but not hours of work. However, there is increasing evidence that this view of male hours being relatively unresponsive to tax changes is becoming outdated – the proportion of men working part-time has increased significantly during the past 20 years (a trend that long predated the financial crisis – see Clarke and Bangham 2018; Belfield et al. 2017; Blundell et al. 2018).
- Second earners in a household tend to be much more responsive to financial work incentives than the main earner
- Participation (extensive) elasticities and intensive elasticities are particularly high among women who have young children.
- Lone mothers in particular are very responsive to changes in work incentives, a finding observed across a number of studies looking at the impact of the introduction of Working Families Tax Credit (Brewer and Browne, undated).
- Elasticities on both the intensive and extensive margins tend to be higher amongst the young and the old, for whom the trade-off between work and education or retirement respectively can be more finely balanced compared to the trade-off between work and 'leisure' that one might face during 'prime' working age.
- Intensive elasticities tend to be higher over the course of a year or longer than over a shorter period, given the challenges in changing working practices in the short run.

The observation that men are somewhat less responsive than women, (or at least, primary earners are less responsive than second earners) to changes in earnings taxation is borne out in a recent review of the labour market effects of ten pilot CBI schemes (Gibson et al. 2018). Across five 'negative income tax' pilots introduced in the US in the 1970s, small negative employment effects at the intensive margin (hours) were observed for males who were household heads, and somewhat larger hours effects were observed for second earners and female household heads.

On the basis of a detailed review of the literature and its applicability in a UK context, Adam and Phillips specify assumed elasticities to measure the substitution effect on the extensive margin for 85 distinct groups, defined in terms of income, age and family characteristics. On the basis that the intervening period has not produced any directly relevant studies that create a strong case for varying these assumed elasticities, we adopt these same elasticities in this study.

The elasticities used to estimate substitution effects on the extensive margin in this study (taken directly from Adam and Phillips) are shown in Appendix B Tables B1, B2, B3, and B4. Given the uncertainty around the likely magnitude of labour supply responsiveness, three scenarios are identified – a low responsiveness scenario, central scenario, and high responsiveness scenario.

These are elasticities of employment probability with respect to one minus the PTR. The interpretation of these elasticities is that they are a measure of the change in probability of employment from a 1 per cent change in the 'gain-to-work' (where the gain to work is 1-PTR). Note that this is not quite the same as the more frequently reported elasticity of employment with respect to in-work income, but it is the more appropriate elasticity to use in the case of a policy change which affects out-of-work income as well as in-work income (see Adam and Phillips 2013 for a discussion).

Adam and Phillips also specify assumed elasticities to measure the substitution effect on the intensive margin for 10 groups. The interpretation of these elasticities is that they measure the percentage change in hours worked for a given change in the marginal rate of effective taxation faced. We use slightly lower elasticities than Adam and Phillips to measure the responsiveness of hours worked amongst the highest paid 5% of workers. This is because we are interested in changes in labour supply whereas Adam and Phillips were interested in changes in taxable income; and as discussed above, taxable income at the top of the distribution tends to be more elastic with respect to tax changes than do hours worked. The elasticities used in this study are shown in Table B5.

What about evidence in relation to income effects?

As with the literature on labour supply responses generally, it is difficult if not impossible to come to definitive conclusions on what the precise size of elasticities should be, but some generalisations are possible.

The literature is unambiguous in a conclusion that income effects tend to be smaller than substitution effects. Indeed, it is for this reason that many studies – both theoretical and empirical – choose to ignore income effects entirely. Bargain et al. (2014) for example, in an analysis of labour supply responses across EU studies, conclude that 'income elasticities are extremely small'.

Beyond this, there is some evidence that, as with labour supply responses more generally, women with children tend to be more responsive (on both intensive and extensive margins) than men or single women.

Putting some more specific numbers on things, Blundell and MaCurdy (1999), reviewing findings from a range of cross-country studies, report income elasticities for men typically around -0.1 but up to -0.3, whilst for married women they are around -0.2 with a range between -0.1 and -0.3. Note that income elasticities tend to be negative: an increase in net income leads to a fall in hours worked (intensive margin) or the probability of working (extensive margin).

In a review of previous studies, Keane (2011) largely finds evidence for similarly-sized elasticities in relation to income effects – despite the fact that these studies took place in a range of countries using alternative methodologies during the previous three decades.

Blundell, Duncan and Meghir (1998) find an income elasticity for women without children of 0, whilst the elasticity is higher for those with children aged 0-2 (-0.185), declining as the age of youngest child increases to 3-4, 5-10 and 11+ to -0.173, -0.102 and -0.06 respectively.

On the basis of these findings we propose to use the set of elasticity assumptions in Table A6 to capture income effects. As with substitution effects, we propose a range of potential elasticities, captured through low, central and high responsiveness scenarios.

Unfortunately, there is relatively less information on the size of income effects than there is on substitution effects, particularly in relation to recent UK studies. We have therefore decided not to identify separate income effect elasticities for individuals in different points of the earnings distribution.

3.3 Results

3.3.1 Aggregate results

The headline results are summarised in Table 3.2.

For each of the three policy options modelled, Table 3.2 shows the simulated labour supply response under three scenarios for the degree of labour supply responsiveness to a change in financial work incentives: a 'central' responsiveness scenario with low and high responsiveness scenarios either side of this.

Column 1 shows the percentage change in total employment (the change on the extensive margin) resulting from the introduction to each of the three options, and where only substitution effects are considered. Under the central scenario, employment is projected to fall by 2%, 11% and 0.6% under policy options 1-3 respectively.

Why is employment projected to fall? Under policy option 1 (the low-level CBI), the increase in income tax rates required to pay for the CBI shifts the balance of the trade-off between work and leisure slightly in favour of leisure on average, which is enough to induce some people to choose 'leisure' over work (where the term 'leisure' is defined in economists' arguably paradoxical way to include childcare or other caring responsibilities).

Under policy option 2 (the high-level CBI), both the higher level of out-of-work income and higher taxation of in-work income serve to accentuate the scale of these substitution effects. Under policy option 3, the scale of tax and benefit changes is much less substantial, resulting in only a small projected employment rate change.

Column 2 also considers the change in employment from each of the three policy options modelled, but includes income effects as well as substitution effects. Incorporation of income effects does not change the aggregate results materially – the negative employment effect is only slightly different after inclusion of income effects. However, as we will see below, whilst the income effects have relatively little impact on the aggregate results, this hides the fact that they have quite significant positive and negative impacts in different parts of the income distribution, and these countervailing impacts offset each other in aggregate.

Columns 3 and 4 show equivalent information but where the parameter of interest is the employment rate, rather than the employment level.

Column 5 then looks at the change in aggregate hours worked under each policy option, looking initially at substitution effects only, but incorporating both the anticipated changes on the extensive and intensive margins (i.e. these results show the effect on hours worked of

the reduction in employment, and the changes in hours worked of those who remain in employment).

The scale of the changes in percentage terms is clearly more significant than when we considered the extensive margin only – with this difference in relative scale of impact indicative of the extent to which the three policy options are projected to reduce hours worked as well as employment in total. But the relative scale of impact across the three policy options is similar as when the extensive margin only was considered. Again, incorporation of income effects (column 6) makes little difference to the aggregate change in labour supply.

Table 3.2: Summary of aggregate labour supply results

Policy Option	Elasticity	Extensive impact				Extensive + Intensive impact	
		Change in employment		Change employment rate		Change total weekly hours worked	
		Substitution effect only	Income and substitution effects	Substitution effect only	Income and substitution effects	Substitution effect only	Income and substitution effects
		1	2	3	4	5	6
Base case		2,560,841	2,560,841	59.70%	59.70%	91,232,792	91,232,792
1	Low	-1.1%	-1.5%	-0.70%	-0.90%	-1.9%	-1.9%
	Central	-1.8%	-2.3%	-1.10%	-1.30%	-4.2%	-4.3%
	High	-2.2%	-2.8%	-1.30%	-1.70%	-6.2%	-6.3%
2	Low	-5.2%	-5.8%	-3.10%	-3.40%	-9.4%	-9.6%
	Central	-9.6%	-10.4%	-5.70%	-6.20%	-24.9%	-25.3%
	High	-14.2%	-15.4%	-8.50%	-9.20%	-39.0%	-39.8%
3	Low	-0.4%	-0.7%	-0.20%	-0.40%	-1.0%	-1.0%
	Central	-0.6%	-0.9%	-0.40%	-0.50%	-1.9%	-1.9%
	High	-0.9%	-1.1%	-0.50%	-0.70%	-2.8%	-2.7%

3.3.2 Results across the distribution

The previous sub-section showed that the CBI policy options are projected to have quite negative labour supply effects, on both the extensive (employment) and intensive (hours) margins. But what explains these effects? One way of answering this question is to look in more detail at the projected labour supply effects in different parts of the income distribution.

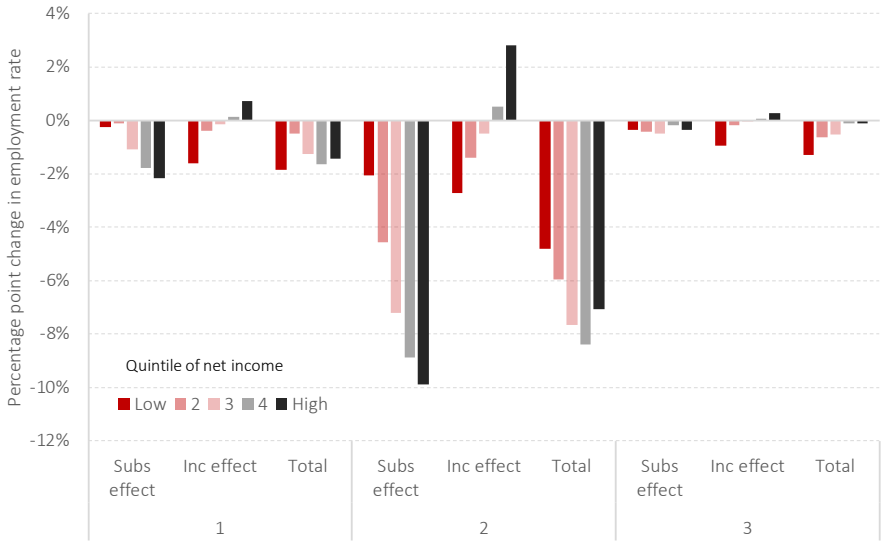
Chart 3.1 shows the projected labour supply impact of the CBI policy options on the extensive (employment rate) margin. For each of the three options, the chart shows the labour supply impact of the substitution effect, the income effect, and the combined effect respectively, for five quintiles of the distribution of net benefit unit income.

Consider first the substitution effect. For each CBI policy option, the size of the negative employment impact increases as we move through the income distribution from the lowest to highest quintiles of net income. This partly reflects the fact that the employment rate increases across the income distribution (so a projected fall in the employment rate of say 2 percentage points represents a larger proportionate fall in employment in the lowest income quintile compared to the highest income quintile). But more significantly, it reflects the fact that, whilst the Participation Tax Rate increases across the distribution, it increases more substantially at the top of the distribution than at the bottom. This is shown explicitly in Chart 3.2.

Recall that a higher PTR reflects worsened financial incentives to choose work over leisure. The CBI policy options result in increased PTRs because they tend to reduce the difference between net in-work income and out-of-work income (the CBI increases out-of-work income relative to the status quo, and whilst the CBI is not tapered away from those who are in-work and thus may result in higher incomes for some of those in work relative to the status quo, the scale of the income tax increases required to fund the CBI mean that the difference between in-work and out-of-work income deteriorates for virtually everyone).

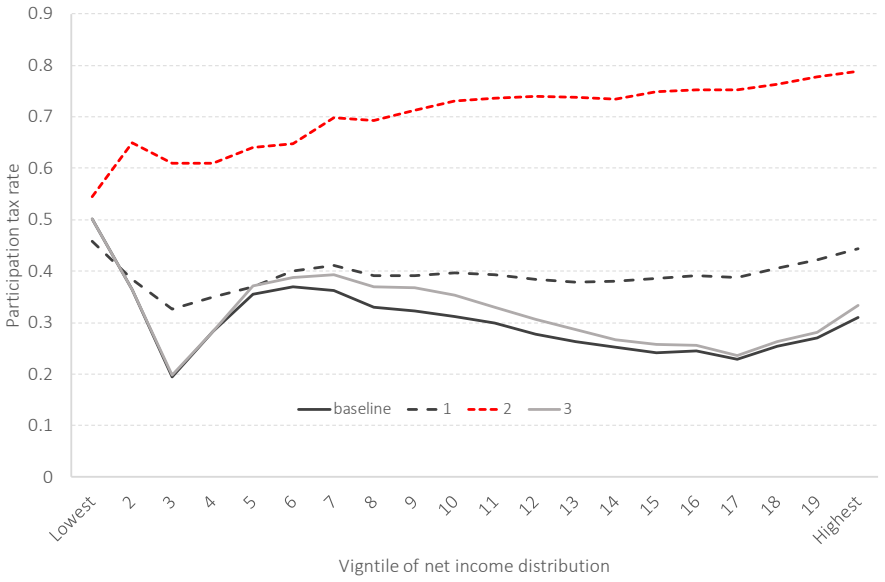
But it is at the top of the income distribution where PTRs increase most relative to the status quo (i.e. work incentives deteriorate the most) given that the scale of the income tax increases at this end of the distribution results in a particularly large eroding of the difference between in-work and out-of-work income. The high-level CBI scheme results in much larger increases in PTR than the low level CBI scheme, both because of the relative scale of the increase in out-of-work income, and because of the larger increases in income taxation to pay for it.

Chart 3.1: Changes in employment rate (extensive margin) across the income distribution



Source: Fraser of Allander

Chart 3.2: PTRs across the income distribution under status quo and modelled policies



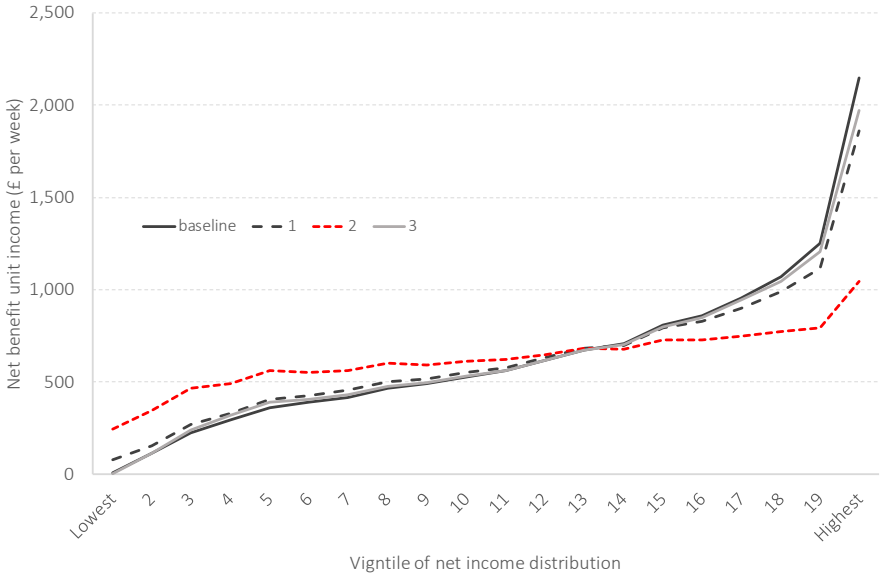
Source: Fraser of Allander

What about income effects?

Chart 3.1 shows that income effects have quite different impacts across the distribution. In the lower part of the income distribution, income effects have negative impacts on labour supply, accentuating the negative impact of the substitution effect. But at the top of the distribution, income effects have a positive impact on labour supply, mitigating some of the negative impact of the substitution effect.

This pattern can be explained relatively simply by considering a chart showing the change in benefit unit net income following the introduction of each CBI policy (Chart 3.3). Benefit units in the lower part of the distribution tend to see increases in their net income as a result of the CBI policies (with the CBI itself offsetting the higher tax rate paid on gross income), and so the income effect in itself reduces work incentives for these benefit units. But higher up the income distribution, the cash value of the CBI is more than offset by increased tax rates, so that benefit unit net income is lower than under the status quo.

Chart 3.3: Benefit unit net equivalised income across the income distribution under status quo and modelled policies



Source: Fraser of Allander

What about the intensive margin? Chart 3.4 shows results in the same format as Chart 3.1 – where results are broken down into substitution and income effects and by income quintile – incorporating impacts on the intensive as well as extensive margins.

The overall pattern here is similar to the picture for extensive effects only. The substitution effect results in a larger proportionate decline in hours worked as we move through the income distribution, but this effect is offset by the income effect.

What determines the size of the substitution effect on the intensive margin is the change in marginal effective tax rate (METR) following the introduction of a CBI. And again, it is in the upper half of the income distribution where the largest increases in the marginal tax rate are seen, particularly in the cases of the high-level CBIs.

Chart 3.5 plots the average METRs faced in each vigintile of the income distribution. Under the status quo (baseline), families in the lower third of the income distribution often face

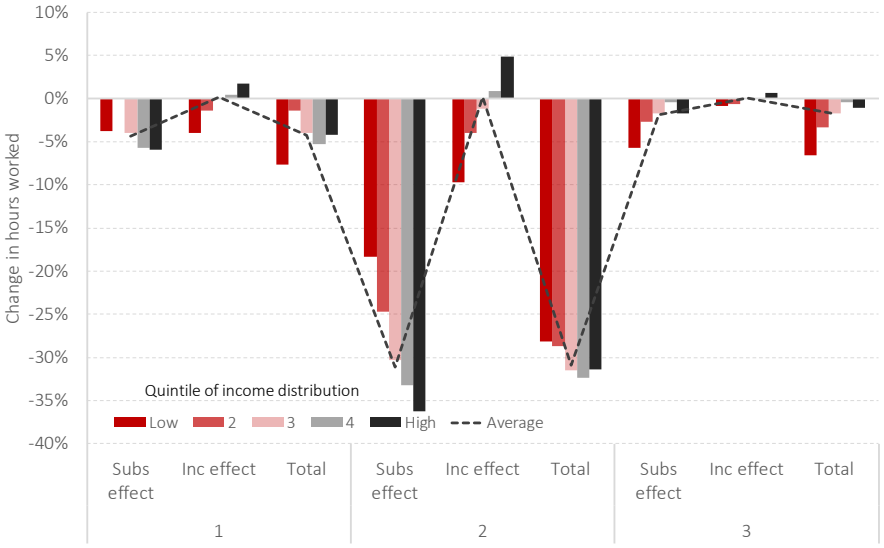
quite high METRs as various means-tested benefits are withdrawn with each additional pound of income. In the middle of the income distribution, the typical METR is just over 0.3 (the basic rate of income tax is 20% whilst the employee NICs contribution is 12%). Families at the top of the distribution face higher marginal tax rates.

The low-level CBI does result in a fall in average METRs in the lower third of the income distribution, and hence some increase in average hours worked (although individuals in this part of the distribution are typically assumed to be not very responsive to changes in work incentives on the intensive margin). But in general, the CBI policies result in increased METRs, for most of the distribution in the case of the low level CBI, and for all of the distribution in the case of the high level CBIs.

The high-level CBI result in METRs of around 70% in the lower part of the distribution. This reflects the basic rate of tax of 59%, on top of which there remains employee NICs and the withdrawal of housing benefits and disabled elements of Universal Credit. The METRs increase to over 80% in the top part of the distribution, reflecting the income tax rates required to fund the CBI.

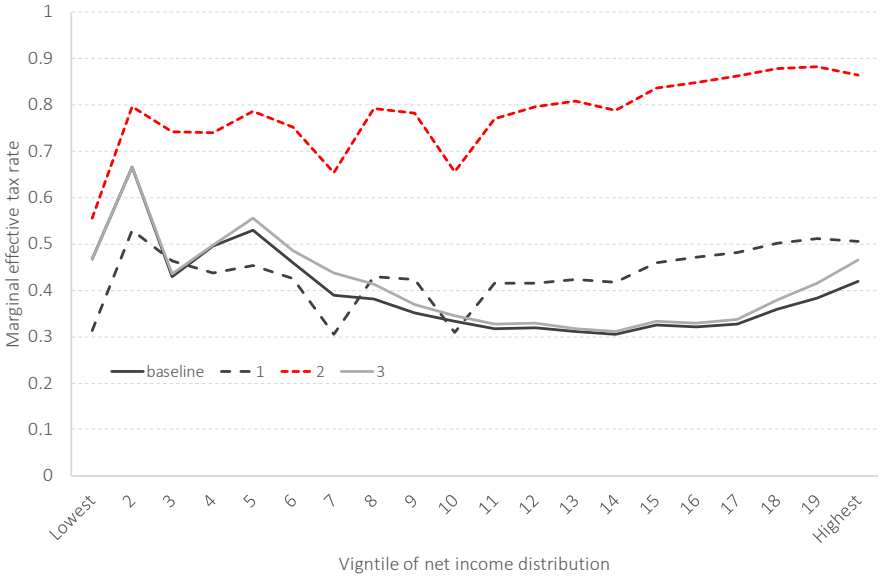
So, the scale of the substitution effect – and its pattern across the income distribution – is determined by the pattern of changes to METRs. The income effect on the intensive margin is again influenced by the pattern of change in net benefit unit income, and has broadly the types of impacts on the intensive margin as was the case for the extensive margin.

Chart 3.4: Change in hours worked (intensive and extensive margins combined) under three modelled policies, across the distribution of net income



Source: Fraser of Allander

Chart 3.5: Benefit unit net marginal effective tax rate across the income distribution under status quo and modelled policies



Source: Fraser of Allander

3.4 Conclusions

The results indicate a large negative labour supply response to the introduction of the proposed CBI policies. The size of this labour supply response is lowest under the low-level CBI, but is larger under the high-level CBI.

The 'substitution effect' of the CBI policies induces a reduction in labour supply across the distribution. This is because, although a CBI scheme leads to an increase in net income for some households, it reduces work incentives on the extensive margin by reducing the difference between in-work and out-of-work income, and it reduces work incentives on the intensive margin by levying a higher rate of marginal taxation.

Income effects accentuate this negative labour supply impact in the lower part of the income distribution (as the scheme increases net income relative to the status quo) but mitigate it towards the top of the distribution (where reductions in net income relative to the status quo offset some of the impact of reduced work incentives arising from the substitution effect).

The fact that the modelling suggests that labour supply would likely fall following the introduction of a CBI, even in the lower part of the income distribution, might run counter to some people's expectations. After all, an argument often put forward for CBI policies is that they may improve work incentives because they do not withdraw out-of-work and low-income benefits as people move into employment.

However, the CBI policies modelled here do retain some means tested elements of the existing benefit system (including housing benefit and child disability elements of Universal Credit). And because the policy has been designed to be wholly or largely funded through the income tax schedule, those in work face higher marginal and average rates of income taxation than they do currently. Hence the policies modelled here tend not to reduce marginal effective tax rates, or participation tax rates, compared to the status quo. It is conceivable that a CBI funded through increased taxation on wealth, land or pollution might not induce such unambiguously negative labour supply effects, but it has been beyond the scope of this report to consider the economic impacts of funding a CBI through these alternative channels.

It is worth pointing out that, whilst the labour supply effects are quite significant, the impact on taxable income could be even larger, given that taxable income tends to be more responsive to tax increases than hours worked in themselves.

There is of course a degree of uncertainty around the size of the potential behavioural response, and hence the scale of the labour supply impact. The extent to which people might respond to a change in their financial work incentives – measured by the various elasticities –

has been informed by existing empirical evidence, but is subject to uncertainty for a range of reasons.

Uncertainty is inherent in the existing estimates of the behavioural response to specific policy changes. In particular, it is difficult to estimate the behavioural response to a given tax or benefit change because no 'counterfactual' policy option can ever be observed. Various statistical techniques exist to try to estimate what the counterfactual might be, but there is rarely one definitive way to do this. For example, estimates of the elasticity of income with respect to changes in the Additional Rate of income tax in the UK range from 0.05 to 0.95 (Phillips and Browne, 2017).

But even where there is a reasonable degree of uncertainty about the degree of responsiveness of a particular group to a particular policy change in the past, there is a question about the transferability of that estimate to the specific case of a CBI in Scotland. The question of the 'transferability' of a given elasticity estimate to the case of a CBI in Scotland will depend on factors like the comparability of labour-market institutional factors and broader social policy context, the magnitude and salience of policy change, and the type of policy change assessed.

Nonetheless, whilst there is significant uncertainty around the exact scale of the behavioural response, we feel confident that the direction and broad range of changes indicated here are reflective of the most appropriate evidence that is currently available.

Section 4: Modelling the Macroeconomic Impact of a Scottish Citizen's Basic Income

4.1 Introduction

The previous section looked at the potential labour supply response to the introduction of a Citizen's Basic Income (CBI). But the wider macroeconomic impacts of a CBI have rarely been analysed.

The proposed Scottish CBI here is substantial, permanent and unconditional. This means that such a change in policy will undoubtedly have structural impacts upon the economy.[26]

This section therefore looks at the macroeconomic impacts of introducing such a CBI[27].

Why is this important?

The balance of economic activity is ultimately crucial to wider government objectives, including inclusive growth. Levels of economic activity are also important for raising general taxation that funds public services. In addition, it is likely that there will be possible policy trade-offs or, opportunities for 'double-dividends', from such a policy. Of course, the existence of trade-offs would not in itself militate against the introduction of the CBI; it simply clarifies any macroeconomic costs of doing so.[28]

Accordingly, we employ a well-respected economic model to explore the possible macroeconomic consequences of a CBI. The model that we use is a Computable General Equilibrium (CGE) model of the Scottish economy, developed by the Fraser of Allander Institute. Such models are useful tools to help analyse and understand the possible impacts of policy. But as with any model it is important to be clear about the data and assumptions used, and how these drive the results.

[26] There are very few existing studies of macroeconomic impacts of a CBI, with apparently no theoretical analyses and no papers in refereed journals. However, Nikiforos *et al.* (2017) and the Penn Wharton Budget Model (PWBM, 2018) provide recent empirical analyses of the introduction of a hypothetical, substantial CBI in the US economy, although they come to radically different conclusions about its likely impact, reflecting their conflicting views on supply-side impacts. So the macroeconomic evidence is as yet very thin and contradictory.

[27] There are of course all manner of potential costs and benefits with such a major policy shift, including impacts upon wellbeing, health outcomes and social cohesion. This section is limited to the macroeconomic impacts.

[28] Some of the benefits of the CBI may have a positive impact on well-being, but may not affect economic activity or do so adversely.

Moreover, modelling of this nature has to be employed with particular caution, particularly give the scale of the proposal.

Our results should therefore be interpreted as indicative with the key objective being to show the scale of possible impacts and – crucially – the channels through which different factors will have an impact. In doing so, they also highlight where complementary policies may be best targeted.

It should be noted that the proposed CBI we model could not be implemented by a Scottish Government under the current fiscal arrangements, which further highlights the hypothetical nature of the modelling work. In our modelling work, the net cost of the CBI is met by a rise in the average income tax rate. In what follows, we focus upon the low-level CBI[29].

From a macroeconomic perspective, there are two channels through which a CBI will have an impact:

- Demand side
- Supply side

In fact, the planned implementation of a CBI in the Scottish context introduces a rather complex combination of demand and supply impacts. However, to simplify and clarify the analysis, it is helpful initially to consider these in isolation.

In Section 4.2, we summarise our modelling framework. (A full account is in Annex D)

In Section 4.3, we focus on the demand side. In fact, "the" demand side impact is itself a combination of different disturbances, so again we decompose these for clarity. Results, not surprisingly, depend on assumptions about the financing of the CBI.

On the supply side, the crux is how households react to changes in tax and the CBI, and the knock-on implications of these behavioural responses for the wider economy.

We adopt two main approaches on the supply side.

In the first approach, explored in Sections 4.4, 4.5 and 4.6, we assume that the supply side is characterised by imperfect competition and wage bargaining. In Section 4.4 we analyse the basic labour market models in the macro-to-macro approach. At one end of the spectrum workers may not fully value even their own CBI payments when bargaining over wages, since these are paid irrespective of employment status. At the other end, they may fully value all CBI payments, irrespective of who the recipients are. In this latter case, workers regard the

[29] The scale of the net cost of the high-level CBI is such that it exceeds the current level of total Scottish Government expenditure, and a change of this order of magnitude proves challenging for the solution of any macroeconomic model. Accordingly, we focus exclusively on the low-level CBI proposal.

reduction in inequality and poverty as part of their "social wage". In Section 4.5 we provide a summary of the macroeconomic impacts of the various bargaining models and compare them with an alternative policy of modifying universal credit. In Section 4.6 we explore a range of additional supply-side impacts that have been associated with the introduction of a CBI, and assess the sensitivity of the modelling results to skill and sectoral disaggregation.

In the second major approach, developed in Section 4.7, we assume that individuals'/groups of individuals' labour supply decisions are governed by the changes in incentives implied by the microsimulation analysis and analysed in detail in Chapter 3. We use aggregate measures of these estimates to generate a shock to the supply side of the macroeconomy.

Of course, there may be other links between a CBI and the economy, most notably through improvements in productivity, should it lead to better health and education outcomes. Whilst the evidence on such links is slight (and typically qualitative), we consider the principle behind such an argument and explore its potential impact.

In Section 4.8 we present a summary and conclusions.

4.2 The modelling framework

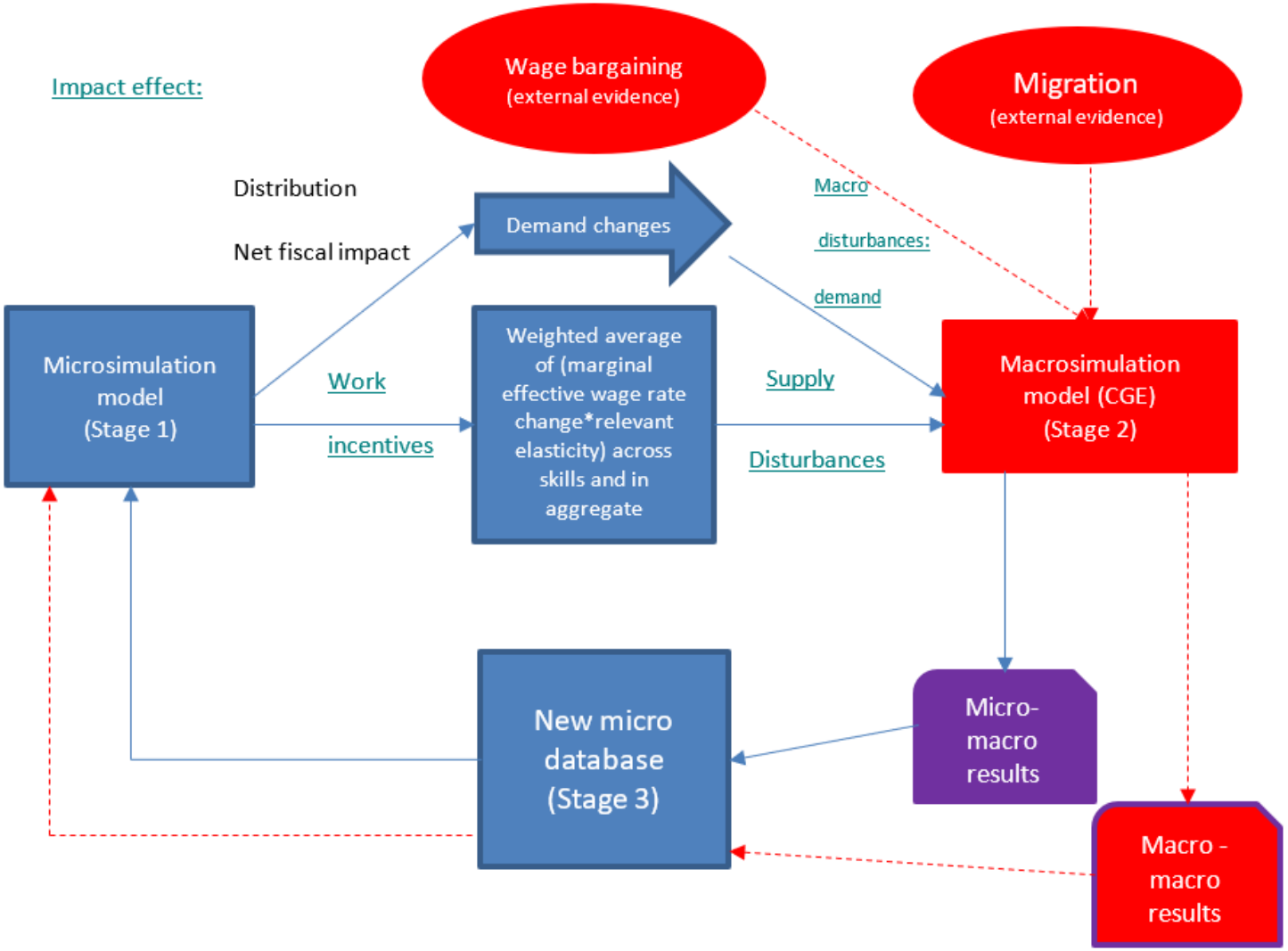
We first provide an overview of our modelling framework and a brief summary of the structure of our CGE model.

4.2.1 Overview of the modelling framework

Recall that our modelling framework is summarised by Figure 4.1.

What we are interested in here is Stage 2.

Figure 4.1. The structure of the economic modelling framework



For the purposes of the macroeconomic modelling we take the microsimulation analysis, - which identifies the "immediate" impact of the introduction of the CBI on the distribution of income across individuals and households – together with the fiscal assumption (typically fiscal neutrality) to inform the scale of the demand side disturbance.

Table *4.1* summarises the substantial immediate impacts of the CBI on household income (in 2019 prices) across 5 quintiles within the income distribution. As intended, the policy heralds a significant societal shift.

Table 4.1 Income impacts by household (2019 basic prices).

Household Group	Total quintile income (£ million)	Average income	Average change per year	Change (percentage)
HG1	10,166	£9,967	£3,640	36.52%
HG2	14,438	£13,621	£2,860	21.00%
HG3	23,812	£22,465	£1,924	8.56%
HG4	34,129	£31,311	£156	0.50%
HG5	54,860	£54,317	-£5,304	-9.76%

In what follows next, we take two approaches.

Firstly, there is the *'macro-to-macro approach'*, which is reflected in the red loop in Figure 4.1 and explored in Sections 4.4, 4.5 and 4.6 below. Here we respond to evidence that there are imperfections in labour markets. We therefore implement a range of alternative bargaining models.

Secondly, there is the *'micro-to macro'* approach, which is reflected in the blue loop in Figure 4.1. and implemented in Section 4.7 below. Here we take the estimate of each individual's/ group's change in labour supply in response to the introduction of the CBI – as set out in Section 3 - and explore the subsequent macroeconomic impact. This approach is predicated upon the assumption that labour market institutions (firms and unions) are effectively a veil: individuals' decisions ultimately determine aggregate labour supply.

Finally, and as highlighted above, it should be noted that we focus primarily on the low-level CBI as the option in our modelling – Policy Option 1 (although we briefly explore the macroeconomic impacts of Policy Option 3)

4.2.2 Introduction to the general equilibrium model

Computable general equilibrium (CGE) models provide a detailed description of the economy which captures the key interlinkages between the private sector, households, government, international trade and the labour market.

They combine economic data with a complex system of equations to give an accurate picture of the structure and operation of the economy.

These models are ideal for simulating the impact of policy. They are used extensively by governments to assess the merits of alternative policy choices.

The model used here (and summarised in Annex D) is one of Scotland.

Scotland's integration with the rest-of-the-UK (RUK) and the rest-of-the-world (ROW) is captured through detailed trade and migration flows.

Broadly defined, it is a multi-sectoral, forward looking, imperfectly competitive CGE model.

The outputs generated include:

- GDP, employment, unemployment, capital stock, population, real wages, and CPI
- For each sector: gross output, intermediate inputs, value-added, employment and capital stocks, and prices
- Public expenditure and tax revenues
- Households disaggregated by income
- Labour market disaggregated by skill (skilled/unskilled).

Model parameters come from several sources. A large number are calibrated using a Social Accounting Matrix (SAM). The SAM is constructed based on the analytical Input-Output (IO) tables produced by the Scottish Government[30].

Others come from "external" sources, including the econometric estimation of key behavioural equations (such as the wage curve and the migration function), and from the literature.

All simulations isolate the macroeconomic effects that are attributable solely to the introduction of the CBI.

So all the effects should be understood as indicating what is likely to happen to the macroeconomy *relative to* what would happen in the absence of the CBI.

[3030] A full specification of the methodology underlying the creation of the Scottish SAM is available (see Emonts-Holley et al, 2014).

Importantly, this also indicates the likely impact relative to the rest of the UK (and other countries more broadly) in response to a Scottish-specific CBI.

4.3 The demand-side impacts of the CBI

The impacts of the CBI on demand are identical for both our micro-to-macro and our macro-to-macro simulations.

For now, we abstract from all potential supply-side responses to the CBI[31].

The results are not simply of interest in providing a "decomposition" of the overall impacts of the CBI. In particular, if nominal wages are genuinely inflexible - motivated, for example, by the prevalence of national bargaining or commitment to a "social wage", both of which are discussed more fully in Section 4.4 – then the results reflect the likely macroeconomic response.

The demand side impacts of a CBI depend, as we would expect, on the method of financing. Here we consider two alternatives, one of which is hypothetical, but serves to aid the interpretation of our results:

- Externally-funded or deficit-financed CBI (hypothetical)
- Balanced budget CBI: fiscally neutral, involving a combination of income tax rises and a reduction in other social security payments

We consider each of these cases (and a number of related sub-cases) in turn.

4.3.1 Externally-funded or deficit-financed CBI

Consider first, the case of a Scottish deficit-financed (or externally financed, for example from a Sovereign Wealth Fund) CBI.

Note this scenario is unrealistic, it provides a useful benchmark to assist with interpretation.

External funding implies an injection of new spending through the substantial increase in (net) transfers. Columns 1 and 2 of Table 4.2 summarise the short- and long-run impacts of an externally funded CBI[32]. In the short-run capital stocks are fixed, but over the long-run they adjust fully. The entire adjustment paths for GDP and employment are presented in Figure 2.

[31] We achieve this in our macroeconomic modelling by imposing a fixed nominal wage in the labour market and, initially, assuming no migration.

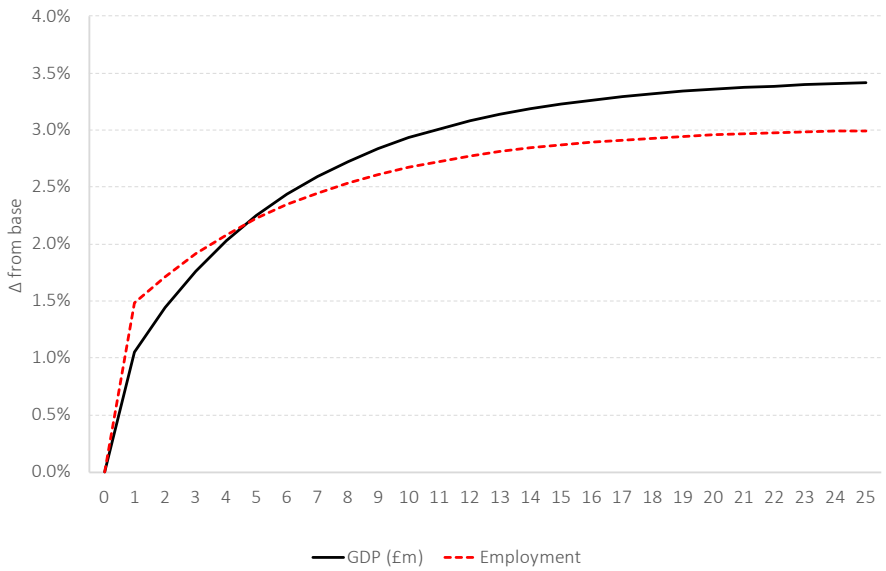
[32] It should be noted that all results are presented relative to a baseline. For example, a long-run value of -1% simply says that relative to the baseline, the economy will be 1% smaller.

Table 4.2 Short and long run impact of an externally funded, Policy Option 1 (low-level CBI)[33]

	Short-Run	Long-Run
GDP (£m)	1.05%	3.46%
Consumption	6.78%	8.61%
Investment	5.62%	4.00%
Total Exports	-2.69%	0.00%
Total Imports	4.87%	4.85%
Nominal Gross Wage	0.00%	0.00%
Real take home wage	-1.38%	0.00%
CPI	1.40%	0.00%
Real cost of capital	0.95%	0.00%
Unemployment Rate (pp difference)	-1.39%	-2.84%
Employment	1.48%	3.03%
Total HH Tax	1.99%	3.34%
Income Tax	1.48%	3.03%
Transfers to HH from Gov	117.37%	117.37%
Real Scottish Government Consumption	0.00%	0.00%
HG1 Lowest income group's consumption	29.78%	31.46%
HG2 Second quintile's consumption	17.26%	19.17%
HG3 Third quintile's consumption	7.49%	9.31%
HG4 Fourth quintile's consumption	0.42%	2.37%
HG5 Highest income group's consumption	0.32%	2.09%

[33] While it matters for only one or two results, for consistency we report results to the second decimal point throughout this section of the report and in the associated annexes.

Figure 4.2 Adjustment paths of GDP and employment with an externally funded, Policy Option 1 (low-level CBI)



Source: Fraser of Allander

In the short-run both GDP and employment rise, and the positive impacts grow over time.

In the long-run, there is a substantial rise in consumption of 8.6%, which ultimately generates a 3.5% stimulus to GDP – primarily in response to a substantial 117% increase in government transfers to households. The import intensity of consumption is reflected in the 4.9% rise in imports.

The changes are strongly progressive. In the long-run, the lower-income household groups benefit through a large increase in consumption of 31.5% (household group 1), 19.2% (household group 2) and 9.31% (household group 3).

However, the distinctive impacts among income groups is an important result and of all subsequent simulations: the expenditure of higher income households is more labour-intensive and less value-added intensive than lower income households. So although all household groups' incomes and expenditure rise, this is concentrated on lower income households, and so on capital and value-added-intensive goods.

Clearly, if this case was feasible, it would be a rather attractive one: economic activity and employment expand significantly and ***all*** households benefit. Both the distributional and economic elements of "inclusive growth" are improved: there would be a "double-dividend".

4.3.2 Balanced-budget implementation of the CBI

Not surprisingly, the imposition of a balanced-budget constraint modifies the estimated macroeconomic impacts significantly.

In particular, the net transfers to households now have ultimately to be funded by a reduction in the incomes of other households.

Accordingly, in the present context the macroeconomic impacts reflect the net effect of two countervailing forces: the increase in the incomes and consumption of low-income groups and the corresponding reductions amongst higher income households.

In the context of a highly aggregated macroeconomic model there would be a presumption of a net stimulus to consumption, reflecting the greater marginal propensity to consume of lower income groups.

However, in the context of multi-sectoral models such as ours even the direction of the net effect is unclear, since, as already noted, changes in the *composition* of consumption – reflecting the redistribution of income by household – can have macroeconomic impacts, since it involves an increase in the capital- and value-added intensity of consumption.

Income-tax-(and partial benefits)-financed CBI

Here the CBI is funded – after eliminating some other benefits and personal allowances – solely by rises in income tax rates.[34]

Columns 1 and 2 of Table 4.3 report the short and long run results

As set out in Chapter 2, here the income tax rate has increase sharply to cover the cost.[35]

[34] The macroeconomic analysis focuses on the impacts of the required changes in income tax rates. The other changes are assumed to have no behavioural effects.

[35] The average tax rate in the base year is 14.1%; in this simulation it rises to 24.5%.

Table 4.3. Short and long run impacts of an income tax-financed, Policy Option 1 (low-level CBI)

	Base CBI		HG1 change to HG2	
	SR	LR	SR	LR
GDP (£m)	-0.15%	0.10%	-0.08%	0.44%
Consumption	-0.13%	0.00%	-0.22%	0.20%
Investment	0.19%	0.46%	0.75%	0.89%
Total Exports	-0.30%	0.00%	-0.52%	0.00%
Total Imports	-0.08%	-0.01%	-0.24%	-0.14%
Nominal Gross Wage	0.00%	0.00%	0.00%	0.00%
Real take home wage	-13.10%	-13.06%	-13.28%	-12.94%
CPI	0.06%	0.00%	0.26%	0.00%
Real cost of capital	0.09%	0.00%	0.18%	0.00%
Unemployment Rate (pp difference)	0.29%	0.13%	0.22%	-0.11%
Employment	-0.31%	-0.14%	-0.23%	0.12%
Total HH Tax	36.60%	36.82%	36.71%	36.80%
Income Tax	73.29%	73.62%	73.47%	73.39%
Transfers to HH from Gov	117.37%	117.37%	117.37%	117.37%
Real Scottish Government Consumption	0.00%	0.00%	0.00%	0.00%
HG1 Lowest income group's consumption	30.67%	30.76%	31.20%	31.55%
HG2 Second quintile's consumption	15.10%	15.22%	14.94%	15.34%
HG3 Third quintile's consumption	3.53%	3.65%	3.42%	3.81%
HG4 Fourth quintile's consumption	-6.46%	-6.32%	-6.53%	-6.09%
HG5 Highest income group's consumption	-12.62%	-12.48%	-12.64%	-12.18%

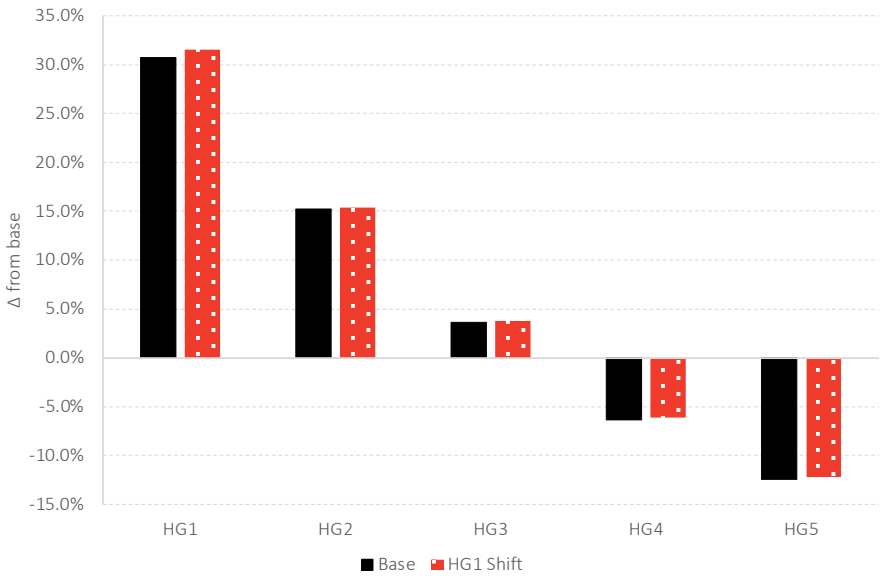
Note that transfers to households increase by the same amount as in the externally funded case (117.4% - a 1.2 fold increase).

However, in this case the transfers are funded by the average income tax rate (and revenues) increasing sharply with a corresponding fall in the real take home wage (of 13.0% in the long-run), given the assumed inflexibility of the nominal wage.

Ultimately, the impact of the increases in the consumption of low-income groups is balanced by reduced consumption for higher income groups - GDP increases by only 0.10%, although employment falls by 0.14%. The overall macroeconomic impact is negative initially.

The impacts on the consumption of household quintiles are, of course, very marked, as indicated in Figure 4.3, reflecting a major redistribution across income groups.

Figure 4.3 Household consumption changes with an income tax-financed, Policy Option 1 (low-level CBI)



Source: Fraser of Allander

The consumption of the lowest income group, HG1 increases by 30.8%, whereas that of the highest income group falls by 12.5% - reflecting the substantial net income tax rises on higher income households' disposable income necessary to finance the CBI.

The importance of the composition of consumption

Not surprisingly, the outcomes reported above are sensitive to the precise composition of changes in the consumption of low- and high-income groups.

The results reported in the first two columns of Table 4.2 reflect the consumption patterns of our base year data. However, in the face of any substantial redistribution of income, the assumption of unchanging household quintiles becomes questionable. In effect, some households would be moved from the upper towards the middle quintiles and vice versa.

As purely illustrative of the importance of the assumptions about expenditure, columns 3 and 4 of Table 4.2 show the difference in results if the lowest income group (HG1) were to adopt the expenditure pattern of the second lowest (HG2).

The impact on GDP becomes bigger, and the net employment effect is now positive[36].

Overall, it seems likely that the net effect of the substantial redistribution of income will have fairly modest effects on demand.

Comparison with an income-tax–financed increase in government expenditure

Here we increase Scottish Government-controlled expenditure exogenously by 21.8%, an amount equivalent to the CBI transfers to lower income households, and adjust the income tax rate to close the budget constraint.

Columns 1 and 2 of Table 4.4 report the results.

[36] Of course, this does not capture the switch among quintiles in the face of any substantial redistribution of income, but it illustrates the significance of the pattern of consumption.

Table 4.4 Income-tax-financed increase in government expenditure, Policy Option 1 (low-level CBI)

	SR	LR
GDP (£m)	2.29%	2.82%
Consumption	-5.31%	-3.43%
Investment	4.73%	1.17%
Total Exports	0.30%	0.00%
Total Imports	-0.03%	0.27%
Nominal Gross Wage	0.00%	0.00%
Real take home wage	-15.67%	-11.20%
CPI	0.19%	0.00%
Real cost of capital	0.51%	0.00%
Unemployment Rate (pp difference)	-3.98%	-3.79%
Employment	4.24%	4.04%
Total HH Tax	48.10%	35.41%
Income Tax	95.75%	69.98%
Transfers to HH from Gov	0.00%	0.00%
Real Scottish Government Consumption	21.83%	21.83%
HG1 Lowest income group's consumption	-0.23%	0.00%
HG2 Second quintile's consumption	-1.72%	-0.99%
HG3 Third quintile's consumption	-3.27%	-1.95%
HG4 Fourth quintile's consumption	-5.12%	-3.12%
HG5 Highest income group's consumption	-11.05%	-7.57%

The impact of this general fiscal expansion is quite different from those of the CBI.

First, the impact on the economy is much greater (GDP rises by 2.8% as compared to 0.1% in the long run, with employment up 4.0%).

Of course, consumption falls (by 3.4% in the long run) as the increase in government expenditure is funded through an increase in the average income tax rate, which reduces households' disposable income and consumption.

But by funding current government expenditure, which has a lower propensity to import than current consumption, this provides a bigger stimulus than the CBI.

However, the scale of the redistribution is much smaller than in the CBI case.

4.3.3 Summary of demand-side impacts

There are a number of conclusions that follow from simulating the impact of the balanced-budget CBI under the assumptions of a fixed nominal wage and no migration.

First, and most important, any balanced-budget CBI ensures that the gains of lower income households must ultimately be funded by higher income households.

Second, while higher income households have higher marginal propensities to save, their consumption is typically less value-added and more labour intensive than lower income households. The net impact on economic activity is therefore positive, but modest. In short, gains from increased consumption amongst lower income households, are largely offset by the reduction in consumption of higher income households.

Third, the scale and direction (of the modest) net macroeconomic impact of an income tax financed CBI on demand is governed by the scale of the changes in disposable incomes of each household group and their precise pattern of expenditure. If these were to alter in a manner consistent with the changes in median disposable income for each quintile the net macroeconomic impact would likely be even more negligible.

Fourth, the impact of a comparable balanced budget expansion in which income tax revenues fund government spending (instead of a CBI) would be unambiguously positive given the lower propensity to import of government spending.

Overall, then, the presence of a "fiscal neutrality" constraint makes it likely that the overall impact of the CBI on aggregate demand is modest.

We now turn to explore the consequences of relaxing these restrictions, and fully accommodating possible supply side responses to the CBI.

4.4 Supply side changes: the "macro-to-macro" simulations

Our primary focus in this section is on supply side impacts.

We consider the impact of the CBI on individuals' (and groups of individuals') supply of labour on the macro-economy in our *micro*-to-macro simulations in Section 4.7 below. Here we focus on the *macro*-to-macro analysis (Figure 4.1).[37]

[37] However, as we have already noted, the macro-to-macro simulations are not independent of the microsimulation analysis, which identifies the scale of the redistribution across household quintiles resulting from the rises in income tax rates (and the scale of any associated fiscal stimulus) and informs our assumptions about the likely responses of those bargaining over wages.

Our earlier discussion identifies a range of potential supply-side impacts. We briefly consider each of these, starting with the potential *adverse* impacts of a CBI.

First, there is the possible response of wage bargaining to any rise in income tax to fund a CBI.

As we have seen, a CBI would result in a substantial cut in real take home wages. How likely is it that workers would be willing to accept this and not seek to bid up their wages?

The conventional bargaining view in economics assumes that workers would not accept this. Instead they would seek to restore their real take home wage to its original level, with adverse consequences for competitiveness.

But contrary to this conventional view, it may also seem unreasonable to assume that workers do not value their CBI at least to some extent.

We therefore explore the impact of workers fully valuing their own CBI payments, which represents a reasonable intermediate position. Here the personal CBI exactly compensates for the reduction in their take home pay in this case.

We also explore the case where workers take into account the full impact of the CBI on their *total family income*; in this case they only seek compensating wage rises to make up for any loss of family income.

Second, there may be adverse migration responses to higher taxes and benefits.

The conventional migration model in economics links net migration to real take home wages and unemployment rates. Major falls in real take home pay may lead to outmigration. However, it would seem irrational for migrants, in particular, not to value a CBI since it would form part of the financial gain to migration. There is a fairly compelling case that migration should be linked to the real wage adjusted for personal, and indeed family, CBI payments.

Third, non-work is now more attractive than work at the margin. The conventional bargaining model argues that an increase in benefits increases worker bargaining power. This would be expected to lead to upward pressure on wages, and a deterioration in competitiveness. (We address this issue in Section 4.6 below.)

What about the potential *beneficial* supply-side impacts of a CBI.

First, the notion of a "social wage" may result in workers accepting lower take-home pay if they value an improvement in income distribution and reduction in poverty. In fact, this case can be regarded as the opposite case of the bargaining model discussed above, one in which workers fully value all CBI payments, irrespective of to whom they are paid.

Second, social wage considerations may also apply to migrants either helping to offset any negative push effect out of Scotland (or indeed encourage more people to locate here). The

notion that migrants would be likely to take a more holistic view of the introduction of the CBI seems compelling, since they are directly comparing (by presumption) a location in which neither CBI payments nor the associated tax rises are present.

Third, it has been argued that benefits act as a subsidy to search activity. A CBI may improve the efficiency of labour market search activity and stimulate the supply side. (We explore this issue in Section 4.6 below.)

Finally, a number of commentators have suggested that a CBI could generate a benefit in the form of higher productivity arising from e.g.: improved health, education and training, which we address in Section 4.6 below.

We next explore the macroeconomic effects each of the alternative characterisations of wage bargaining. We begin by considering potential wage and migration effects.

We take the most reasonable assumption to be that employees bargain so as to maintain their personal disposable incomes (so that their personal CBI payments are fully taken into account). There is, as far as we are aware, little empirical evidence either way. However, it is easiest to consider this case after analysing the limiting case of the conventional bargaining (and migration) model, which focuses exclusively on the real take home wage.

4.4.1 The adverse impact of the rise in income tax rates in the conventional bargaining and migration models

In the conventional bargaining model workers focus on their net of tax take home wage[38].

This assumes that whilst workers do receive the CBI, this (and other non-wage income) has no direct impact on their bargaining behaviour. In effect, workers do not take into full account the financial value of the CBI to themselves and families; it is given zero weight in the bargaining process. What matters to them is their relative position.

In the present case, the shock to the supply side is the change in the average income tax rate required to fund the CBI. This is exactly the same as for our analysis of demand side effects above.

Under this approach, there is now an adverse supply effect associated with the rise in the average income tax rate since workers now bargain for higher wages in an attempt to restore their net of tax real consumption wage.

[38] The formal model is briefly summarised in Annex D.

This has adverse competitiveness effects on trade and therefore would, in isolation, induce a contraction in economic activity and employment.

We know from column 2 of Table 4.3 that the demand effect of the CBI is ultimately only moderately expansionary (0.1% increase in GDP). However, we also know that the real take home wage falls substantially (by 13%), so we would anticipate that the supply impact would strongly dominate. This does indeed prove to be the case.

The first two columns of Table 4.5 report the economic impacts of the CBI when workers bargain over their net of tax real wage. Figure 4.4 illustrates the time path of GDP and employment.

The result is a contraction in economic activity with GDP falling by 8.8% and employment by 9.7%, with investment falling by less (8.9%), reflecting some substitution away from the now more expensive labour in favour of capital.

Workers are only partially successful in restoring their real net of tax wage, which ultimately falls by 9.9% (compare to column 2 of Table 4.3).

The relative weakening in economic activity pushes up the unemployment rate to 9.1%.

Table 4.5 Short and long run impacts of an income tax-financed, low-level CBI with bargaining (and no migration), Policy Option 1 (low-level CBI)

	SR	LR
GDP (£m)	-2.61%	-8.79%
Consumption	0.40%	-4.65%
Investment	-7.57%	-7.86%
Total Exports	-3.43%	-10.52%
Total Imports	-0.18%	-1.77%
Nominal Gross Wage	10.17%	13.22%
Real take home wage	-6.01%	-9.93%
CPI	1.62%	4.00%
Real cost of capital	1.19%	3.16%
Unemployment Rate (pp difference)	4.38%	9.14%
Employment	-4.66%	-9.73%
Total HH Tax	43.22%	50.89%
Income Tax	84.08%	102.01%
Transfers to HH from Gov	117.37%	117.37%
Real Scottish Government Consumption	0.00%	0.00%
HG1 Lowest income group's consumption	29.76%	26.68%
HG2 Second quintile's consumption	14.79%	10.72%
HG3 Third quintile's consumption	4.02%	-0.27%
HG4 Fourth quintile's consumption	-5.10%	-10.22%
HG5 Highest income group's consumption	-11.95%	-18.38%

There is a substantial fall in economic activity even in the short run, and this grows through time, as is apparent in Figure 4.4.

The impacts of the CBI on the distribution of consumption across households is less positive for lower income groups, and more negative for higher income groups than before.

In large part this reflects the fall in aggregate consumption of -4.7%. Of course, higher income groups are impacted disproportionately so there is still some redistribution, with the consumption of the lowest income group growing by 26.7%, while the highest income group's consumption falls by 18.4%.

The scale of the effects reflects the fact that the CBI is not linked in any way to employment status: it is paid entirely unconditionally to workers (and non-workers). With a CBI, workers

continue to put in the same effort, but the return from working is now reduced (in relative terms).

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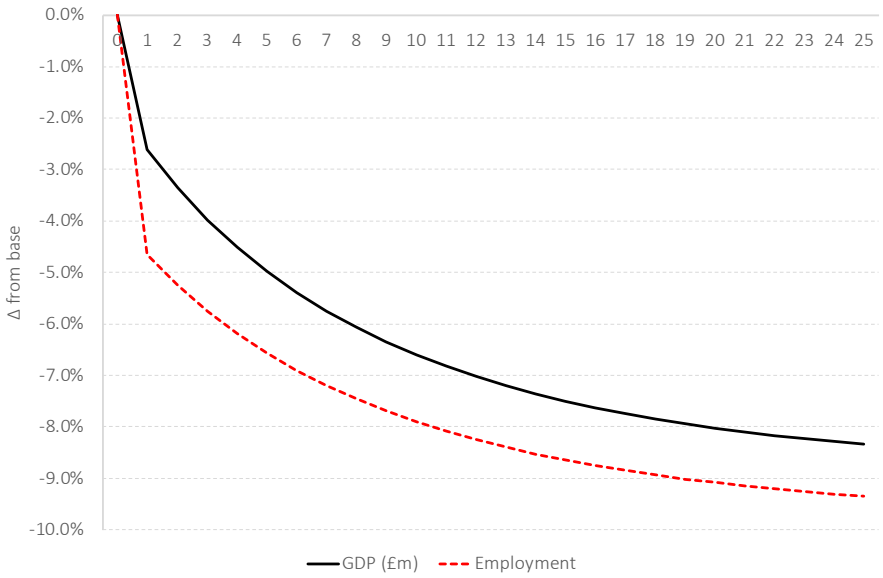
Figure 4.4. Adjustment paths of GDP and employment of income tax-financed, Policy Option 1 (low-level CBI) with bargaining over the net of tax real wage



Source: Fraser of Allander

Other factors

The scale of economic impact is a reflection of the size of the rise in tax required to fund the implementation of the CBI.

If migrants are motivated solely by the take home real wage (and unemployment rate), the impact would be greater than indicated in Table 4.5.[39] The rise in unemployment and fall in the real net of tax wage, would lead to net out-migration.

Note, as economic activity declines, so do other taxes – including devolved taxes - and this would result in a further contraction.

Overall, if workers' and migrants' focus is the real net-of-tax wage rate then the introduction of a CBI of this scale would have negative – and substantial – effects on macroeconomic outcomes.[40]

[39] The formal migration model is outlined in Appendix D.

[40] The impacts are so substantial that the model algorithm could not fully converge in this case.

The main lesson to be drawn is that policymakers need to be aware of the possibility of such "wage push" effects and respond accordingly.

We now turn to possible alternative motivations for workers and migrants that may partially counteract wage push effects.

4.4.2 The impact of the rise in income tax rates and migration models with workers and migrants fully valuing their own CBI payments

A key issue is how likely workers (we consider migrants below) choose to value a CBI in their wage bargaining.

It is possible, at least to some extent, to argue that they may account for the value of their personal CBI (in excess of foregone other benefits and the personal allowance) when pressing for "compensating" wage rises.[41]

The difficulty, as noted above, is the unconditional nature of the CBI, which is paid even if the worker withdraws from the labour force altogether; it is not part of their net wage.

But what if policymakers successfully tie any tax rises to workers' own personal CBI so that they modify their wage claims? Clearly, this would moderate the scale of the "wage push" response: workers in this case "only" seek compensation for the reduction in their net personal income arising from the introduction of the CBI (i.e. the excess of the value of their own CBI over the value of the loss of benefits and the personal allowance.)

The adverse competitiveness effects on trade are substantially reduced – see Table 4.6. Figure 4.5 illustrates the time path of GDP and employment.

The result is still a significant contraction in economic activity with GDP ultimately being 4.4% and employment 5.0% below where they would have been in the absence of the CBI.

However, while the adverse impacts on economic activity are moderated it does imply a greater fall in the take home wage – workers give up some of their wages for the CBI (11.5% reduction as compared to 9.9%).

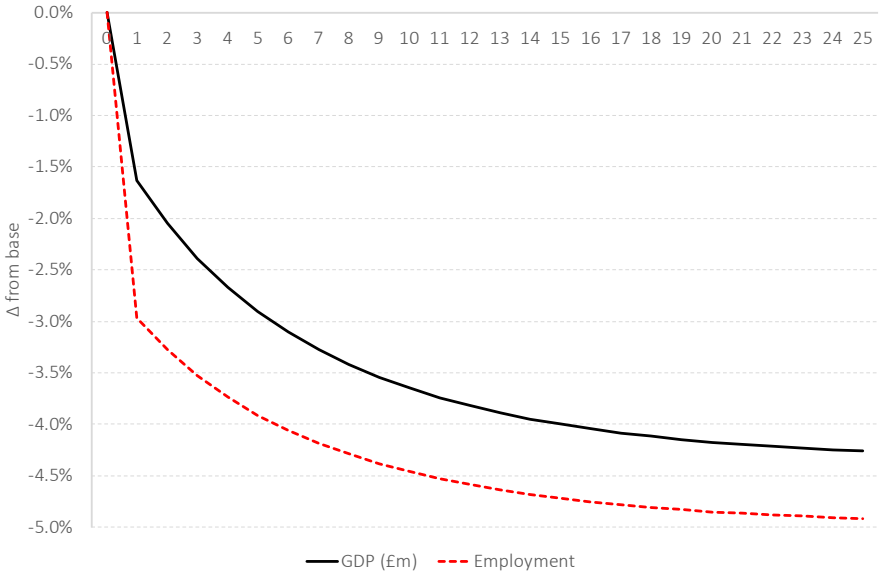
Unemployment eventually increases by 4.7 percentage points.

[41] Recall that we simulate the taxes and transfers required to fund the CBI *net* of the reduction in other benefits and personal allowances. The assumption is that individuals feel fully "compensated" for these losses by the payment of the CBI. Only the tax rate changes required to fund the net transfers induce behavioural change and it is only that part of CBI in excess of the value of reduced other benefits and the absence of personal allowances that is responsible for the rise in income tax rates in the model.

Table 4.6. Short and long run impacts of an income tax-financed, Policy Option 1 (low-level CBI), with workers fully valuing their own CBI payments (and no migration)

	SR	LR
GDP (£m)	-1.63%	-4.35%
Consumption	0.21%	-2.31%
Investment	-4.51%	-3.71%
Total Exports	-2.20%	-5.28%
Total Imports	-0.14%	-0.88%
Nominal Gross Wage	6.08%	6.29%
Real take home wage	-8.82%	-11.50%
CPI	1.00%	1.95%
Real cost of capital	0.75%	1.54%
Unemployment Rate (pp difference)	2.79%	4.68%
Employment	-2.97%	-4.98%
Total HH Tax	40.55%	43.61%
Income Tax	79.70%	87.32%
Transfers to HH from Gov	117.37%	117.37%
Real Scottish Government Consumption	0.00%	0.00%
HG1 Lowest income group's consumption	30.12%	28.73%
HG2 Second quintile's consumption	14.92%	12.99%
HG3 Third quintile's consumption	3.84%	1.70%
HG4 Fourth quintile's consumption	-5.61%	-8.25%
HG5 Highest income group's consumption	-12.19%	-15.40%

Figure 4.5. Adjustment paths of GDP and employment of income tax-financed, Policy Option 1 (low-level CBI), with workers fully valuing their own CBI payments (and no migration)



Source: Fraser of Allander

Other factors

As before, there remain incentives for net out-migration, ultimately resulting in a loss in population – see Table 4.7. The important message is not the numerical results, but simply the point that migration will add to the scale of any macroeconomic impact.

Table 4.7 Short and long run impacts of an income tax-financed, Policy Option 1 (low-level CBI), with workers fully valuing their own CBI payments (with migration)

	SR	LR
GDP (£m)	-1.63%	-15.16%
GDP (£m) per capita	-1.63%	-5.0%
Consumption	0.21%	-8.11%
Investment	-4.51%	-13.79%
Total Exports	-2.20%	-17.98%
Total Imports	-0.14%	-3.10%
Nominal Gross Wage	6.08%	24.50%
Real take home wage	-8.82%	-7.69%
CPI	1.00%	7.16%
Real cost of capital	0.75%	5.62%
Unemployment Rate (pp difference)	2.79%	0.00%
Employment	-2.97%	-16.39%
Population	0.00%	-10.65%
Total HH Tax	40.55%	62.37%
Income Tax	79.70%	125.07%
Transfers to HH from Gov	117.37%	117.37%
Real Scottish Government Consumption	0.00%	0.00%
HG1 Lowest income group's consumption	30.12%	23.69%
HG2 Second quintile's consumption	14.92%	7.40%
HG3 Third quintile's consumption	3.84%	-3.17%
HG4 Fourth quintile's consumption	-5.61%	-13.11%
HG5 Highest income group's consumption	-12.19%	-22.78%

If workers' take full account of all UBI payments to their families the adverse impacts on GDP and employment are further mitigated because the pressure on wages is reduced. We do not discuss the results in detail here since this case was regarded as less compelling than that in which workers only fully take into account their own CBI receipts. However, for completeness the summary results for this case are included in Section 4.5 below.

4.4.3 What if all CBI payments are fully valued by workers and migrants? The social wage model

The "social wage" concept is based on an assumption that workers may feel as well off after the introduction of the CBI as before it.

The basic idea here is that workers would value the CBI that they (and their families) receive and also the reduction in poverty and inequality in society more generally, just as much as the reduction in their real net wage[42].

In this case, workers do not seek to restore the real value of their take home wage. There is no pressure to restore the net of tax real wage, since workers feel as well off after the change as they did before.

The results are summarised in Table 4.8. It is clear that the presence of a 'social wage' has a major beneficial impact on the macroeconomic effects. Here, GDP falls, but only slightly, in the short-run (by 0.1%) and rises slightly in the long run (0.2%).

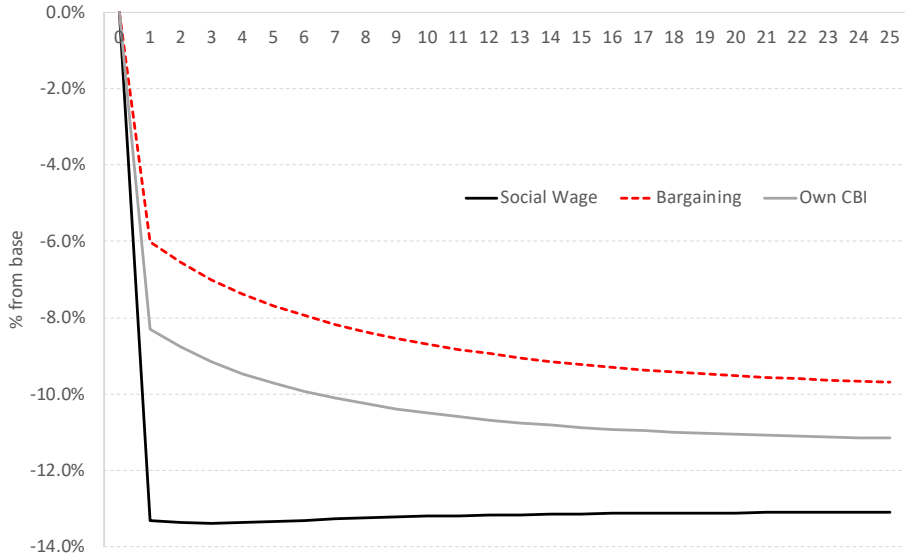
Table 4.8. Short and long run impacts of an income tax-financed, Policy Option 1 (low-level CBI), with social wage and no migration

	SR	LR
GDP (£m)	-0.07%	0.19%
Consumption	-0.15%	0.04%
Investment	0.41%	0.54%
Total Exports	-0.21%	0.11%
Total Imports	-0.08%	0.01%
Nominal Gross Wage	-0.29%	-0.12%
Real take home wage	-13.31%	-13.09%
CPI	0.02%	-0.04%
Real cost of capital	0.05%	-0.03%
Unemployment Rate (pp difference)	0.17%	0.04%
Employment	-0.18%	-0.05%
Total HH Tax	36.41%	36.69%
Income Tax	72.99%	73.35%
Transfers to HH from Gov	117.37%	117.37%
Real Scottish Government Consumption	0.00%	0.00%
HG1 Lowest income group's consumption	30.69%	30.80%
HG2 Second quintile's consumption	15.11%	15.27%
HG3 Third quintile's consumption	3.51%	3.69%
HG4 Fourth quintile's consumption	-6.50%	-6.28%
HG5 Highest income group's consumption	-12.65%	-12.42%

[42] Annex D outlines the basic wage bargaining model.

Figure 4.6 illustrates the change in the net of tax real wage under the conventional bargaining and social wage cases.

Figure 4.6 Adjustment path of net of tax real wage under conventional bargaining and a social wage, Policy Option 1 (low-level CBI)



Source: Fraser of Allander

The overall results are similar to those of the income-tax-financed CBI in the presence of a fixed nominal wage – Table 4.2[43].

The overall macroeconomic impact proves to be broadly neutral under the social wage assumption.

However, this is only so because workers are willing to accept a permanent reduction in their take home wage of more than 13.1%!

The impact of migration

The idea that transactors may look beyond their real net take home wage can also be extended to migrants.

Indeed it would seem certain that rational migrants would wish to include all of the effects of movement on their income levels, including the CBI payments to themselves and their families,

[43] The results are not identical, however, because the social wage case does not have the effect of fixing the nominal wage - under the social wage, bargaining is effectively over the gross, rather than the net of tax real wage.

and wider public services. If they also value the reduction in inequality and poverty sufficiently to motivate the social wage assumption, they would feel no worse off after the introduction of the CBI.

When we allow for migration motivated in this way, the macroeconomic impacts of the tax-financed CBI become slightly less favourable than reported in Table 4.8 – due to the small fall in wages and rise in unemployment. Accordingly, there is an incentive for outmigration.

Allowing outmigration continues until (in this case) the real gross wage and unemployment rates are restored to their original levels, we obtain the results reported in Table 4.9.

Notice that ultimately population falls by 0.09%.

Table 4.9 Short and long run impacts of an income tax-financed, Policy Option 1 (low-level CBI), with social wage and migration

	SR	LR
GDP (£m)	-0.07%	0.10%
GDP per capita	-0.07%	0.20%
Consumption	-0.15%	0.00%
Investment	0.41%	0.46%
Total Exports	-0.21%	0.00%
Total Imports	-0.08%	-0.01%
Nominal Gross Wage	-0.29%	0.00%
Real take home wage	-13.31%	-13.06%
CPI	0.02%	0.00%
Real cost of capital	0.05%	0.00%
Unemployment Rate (pp difference)	0.17%	0.00%
Employment	-0.18%	-0.14%
Population	0.00%	-0.09%
Total HH Tax	36.41%	36.82%
Income Tax	72.99%	73.62%
Transfers to HH from Gov	117.37%	117.37%
Real Scottish Government Consumption	0.00%	0.00%
HG1 Lowest income group's consumption	30.69%	30.76%
HG2 Second quintile's consumption	15.11%	15.22%
HG3 Third quintile's consumption	3.51%	3.65%
HG4 Fourth quintile's consumption	-6.50%	-6.32%
HG5 Highest income group's consumption	-12.65%	-12.48%

Note that a key distinguishing feature of the social wage simulations is the very substantial fall in the real take home wage (as in the fixed nominal wage case). Workers and migrants are willing to absorb this cut in real take home pay – both because they value the benefit to themselves of the CBI and the benefit they feel from being part of a more equal society characterised by a substantial reduction in poverty.

Whether or not this would bear out in reality is an open question.

The contrast between the different outcomes according to bargaining models is a major issue for policy in the context of a CBI. Furthermore, this raises the issue of what policy makers could do to influence that response, including, for example, seeking to influence the wage bargaining process. These are issues we return to in Section 6 below.

4.5 Summary of various adjustments to wage bargaining and the macroeconomic impacts of an alternative policy

Table 4.10 provides a summary of how key macroeconomic results are impacted by various adjustments (Bargaining scenarios 1 through 4).

For comparative purposes we also include the macroeconomic impacts of microsimulation results in Policy Option 3, which involves improving child benefits until the impact on child poverty is comparable to that of the CBI implementation.

The effects of various adjustments to wage bargaining

Bargaining scenario 1 summarises the changes implied by the conventional bargaining model. These correspond to the results reported in Table 4.5 above.

Bargaining scenario 2 shows the impact of workers' fully valuing their personal CBI receipts when bargaining over wages

Bargaining scenario 3 shows the impact of workers valuing their own and their families' CBI payments.

Bargaining scenario 4 summarises the results of the Social Wage model (Table 4.8).

The final column of Table 4.10 identifies the macroeconomic impact of Policy Option 3, which relates to adjustments in child benefits. (Here the conventional bargaining model is assumed to be applicable.)

The central point is that the conventional bargaining and social wage models reflect either end of a spectrum of results, with the adverse supply side effects associated with the CBI diminishing as the models move in the direction of the Social Wage model.

It should be noted, however, that under all assumptions about wage bargaining the CBI succeeds in its primary objective of effecting a substantial redistribution of income in favour of the lower income households.

Table 4.10 The macroeconomic impacts of implementing Policy Option 1(low-level CBI), across various bargaining models and Policy Option 3 (modified child benefit): Summary with NO migration

Results (percentage change from base)	Bargaining 1 (Conv Bargain)	Bargaining 2 (Conv Bargain adj. for worker CBI)	Bargaining 3 (Conv Bargain adj. for family CBI)	Bargaining 4 (Social Wage)	Policy Option 3 (Modified child benefit)
GDP	-8.8	-4.4	-1.7	0.2	-0.7
Employment	-9.7	-5.0	-2.1	-0.1	-0.8
Consumption of lowest quintile	26.7	28.7	30.0	30.8	3.7

If the pure flow model of migration holds, the macroeconomic impacts would be worse in all cases (i.e. more negative/less positive) – Table 4.11.

Table 4.11 The macroeconomic impacts of implementing Policy Option 1 (low-level CBI), across various bargaining models and Policy Option 3 (modified child benefit): Summary with migration

Results (percentage change from base)	Bargaining 1 (Conv Bargain)	Bargaining 2 (Conv. for worker CBI)	Bargaining 3 (Con. for family CBI)	Bargaining 4 (Social Wage)	Policy Option 3 (Modified child benefit)
GDP	*	-15.2	--5.8	0.1	-1.8
Employment	*	-16.4	--6.5	-0.1	-2.0
Consumption of lowest quintile	*	23.7	28.1	30.8	3.4

*The scale of the impacts was such that the model failed to solve in this case.

The macroeconomic impacts of increasing child benefits

The final column in Tables 4.10 and 4.11 compares the macroeconomic impact of an adjustment to child benefits that is income tax financed (Policy Option 3 in Chapter 2) and has

a very similar impact on child poverty as the introduction of the CBI – see discussion in Chapter 2.

For simplicity we have assumed that the only supply side impacts associated with this policy are those associated with the rise in income tax required to fund it (and so the conventional bargaining model is employed here)

In the absence of migration this policy is associated with a small loss of GDP and, of course, a much less marked impact on the consumption of the lowest income group, although the impact is positive.

Only in the social wage case is the GDP outcome more favourable for the CBI.

While the overall distributional impact of the child benefit policy is far smaller, the effect on child poverty is, by construction, the same and the adverse impact on economic activity is typically much less than under the CBI (except where the social wage case holds).

4.6 Other supply side impacts of a Scottish CBI

4.6.1 Direct impact of benefits on bargaining/ labour supply

There are potentially countervailing forces operating on labour market behaviour when benefits are increased.

The view of the conventional bargaining model discussed above was that an increase in benefits (especially unemployment benefits) reduced the costs of being unemployed, and so increased workers' bargaining power. Other things being equal this would lead to an increase in real wages and decline in employment (increase in unemployment).

However, by acting as a subsidy to search, increased benefits could improve the search process and lead to lower unemployment. While this may also be accompanied by increased real wages, here this would reflect higher productivity.

On the basis of the existing (in some cases rather dated) empirical evidence we do not find any substantial macroeconomic effects. (We report the results in Annex E.)

4.6.2 Skills disaggregation

Up to this point we have treated the labour market as an integrated whole. We have, however, also treated skilled and unskilled labour as having distinct labour markets.

The demand for each skill group is obtained by separately aggregating their demands across all sectors. This results in separate demands for skilled and unskilled labour (although there is a degree of substitutability between skill groups).

The supply side of the labour markets is characterised by distinct skilled and unskilled wage functions.

However, overall, we find that the disaggregation of skills makes little difference to the estimated macroeconomic impact of an income-tax-funded CBI irrespective of the whether wages are determined in real net of tax terms or through a fixed nominal wage. (See Annex F)

However, the behaviour of wages continues to have a critical impact on the overall outcome.

Under conventional bargaining, with skills disaggregated or aggregated, the key is the resultant substantial reduction in take home pay of workers, which stimulates a major wage-push effect with adverse impacts on economic activity.

4.6.3 Sectoral disaggregation

We also explore the impact of allowing for separate labour markets across sectors (in Annex F).

The public sector is distinctive in typically having a more centralised bargaining system than the private sector (with average unionisation rates of 60.8% compared to 14% in the private sector)[44] and bargaining is "as if" with a single employer.

Accordingly, we explore the impact of distinctive labour markets for the public and private sectors.

Overall, the disaggregation by sectors appears to make little difference to the estimated macroeconomic impact of a CBI. However, if wages are modelled in a non-symmetrical way, with private sector wages being determined in accordance with the bargaining model and wages in the public sector being characterised by a social wage, results are significantly impacted. In this case we obtain results that are intermediate to those for the conventional bargaining model and the social wage model.

4.6.4 The potential stimulus to productivity

A number of potential routes by which the introduction of a CBI may stimulate productivity have been identified, often by case studies of CBI-like interventions.

[44] Source: authors' calculations from the Labour Force Survey (2016).

For example, as we have already seen, the CBI may stimulate more efficient matching in the labour market, through lowering the effective costs of searching (and allowing individuals to hold off for higher wage, higher productivity job offers).

Furthermore, the provision of a basic income allows individuals to choose to invest more in their human capital through education and training, rather than feeling compelled to take low paid, possibly insecure jobs. Some case studies have also identified mental health benefits, which are likely to improve productivity.

However, there is a dearth of empirical estimates of the likely scale of the various possible sources of productivity enhancement arising from the implementation of a CBI. Accordingly, we return to this issue at the end of the study, where we shall explore the extent to which productivity would need to increase to achieve certain economic targets (e.g. no contraction, or a target expansion, in GDP).

However, it is useful to assess the macroeconomic impacts of an improvement in productivity per se, to allow us to isolate and identify the nature and scale of system-wide responses that are directly attributable to that alone. Accordingly, we report the results of an illustrative 3% improvement in labour productivity in Table 4.12.

Table 4.12. Short and long run impacts of 3% increase in labour productivity

	SR	LR
GDP (£m)	1.18%	2.73%
Consumption	-0.57%	0.58%
Investment	3.73%	2.50%
Total Exports	1.67%	3.73%
Total Imports	-0.14%	0.03%
Nominal Gross Wage	-2.06%	-1.19%
Real take home wage	-1.25%	0.12%
CPI	-0.82%	-1.31%
Real cost of capital	-0.57%	-1.04%
Unemployment Rate (pp difference)	0.71%	-0.06%
Employment	-0.75%	0.07%
Total HH Tax	-2.07%	-0.72%
Income Tax	-2.79%	-1.13%
Transfers to HH from Gov	0.00%	0.00%
Real Scottish Government Consumption	0.00%	0.00%
HG1 Lowest income group's consumption	*0.21%*	*0.84%*
HG2 Second quintile's consumption	*-0.07%*	*0.88%*
HG3 Third quintile's consumption	*-0.47%*	*0.61%*
HG4 Fourth quintile's consumption	*-0.94%*	*0.41%*
HG5 Highest income group's consumption	*-0.76%*	*0.50%*

The improvement in labour efficiency is a beneficial supply-side stimulus that improves competitiveness and stimulates economic activity.

GDP rises over the entire adjustment period, by 1.2% in the short run and by 2.7% in the long run.

In the long run employment rises slightly (by 0.1%), reflecting the greater responsiveness of labour demand to changes in the effective cost of labour when firms can expand capacity in response to the rise in profits in the short-run. The real wage falls initially, but rises in the long run. Consumption increases across all household quintiles, broadly benefiting the lower income households by more. Overall, the impact on the distribution of income and expenditure is progressive.

The change in GDP in response is significant but much smaller than the negative hit seen in some of the bargaining models above.

In order to offset the GDP contraction in the bargaining model in which workers fully value their personal CBI, the various potential sources of productivity gain would have to generate an increase in productivity of 4.26%.

If workers (and migrants) can be persuaded of the wider private and social benefits so as to induce a social wage type response and ensure that the potential productivity-enhancing aspects of the CBI are fully exploited, there is the prospect of a policy dividend in the form of simultaneous improvements in both distribution and economic activity.

This would seem to us to be an important area for future research.

4.7 Micro-to macro simulations

The demand side simulations reported in Section 4.3 apply equally in the present context.

As for the macro-to-macro analysis of the preceding sections, there is some external evidence on the microeconomic labour supply impact of CBI-type interventions from existing case studies, although very few provide quantitative evidence, and most report no such effect.[45] However, here we focus on the micro-to-macro simulations based upon the microeconomic analysis of Chapter 3.

In this approach the assumption is that individuals are effectively in control of their own labour supply. The change in labour supply at the macroeconomic level is then a weighted average of groups' responses, where the weights reflect the importance of each group of individuals in overall labour supply.

Recall that the microsimulations identify the changes in effective marginal tax rates relevant to participation and hours decisions for a wide range of household groups. These are matched to estimated elasticities of participation and hours decisions with respect to changes in effective marginal tax rates. These combine to provide the likely labour supply responses to the marginal tax rates and finally, these are aggregated to produce an overall estimated change in FTE employment.

The base case from Chapter 3 (Table 4.2 low level CBI central case) implies an overall contraction in labour supply of 4.27%.

Table 4.13 summarises the impact of the implied contraction in labour supply. This constitutes an adverse supply shock, which pushes up real wages, and so reduces competitiveness, exports and investment. In the long run GDP falls by 3.8% and employment by 4.3%.

[45] Annex G provides an illustrative analysis based on Jones and Marinescu (2018).

Table 4.13 The macroeconomic impact of a labour supply shock derived from the microsimulations: a wage inelastic aggregate labour supply curve, Policy Option 1 (low-level CBI)

	SR	LR
GDP (£m)	-2.40%	-3.84%
Consumption	1.08%	-0.81%
Investment	-7.42%	-3.52%
Total Exports	-3.34%	-5.23%
Total Imports	0.29%	-0.01%
Nominal Gross Wage	10.27%	6.22%
Real take home wage	8.45%	4.21%
CPI	1.67%	1.93%
Real cost of capital	1.18%	1.52%
Unemployment Rate (pp difference)	0.00%	0.00%
Employment	-4.27%	-4.27%
Total HH Tax	4.12%	1.09%
Income Tax	5.56%	1.69%
Transfers to HH from Gov	0.00%	0.00%
Real Scottish Government Consumption	0.00%	0.00%
HG1 Lowest income group's consumption	-0.43%	-1.19%
HG2 Second quintile's consumption	0.11%	-1.24%
HG3 Third quintile's consumption	0.89%	-0.86%
HG4 Fourth quintile's consumption	1.81%	-0.57%
HG5 Highest income group's consumption	1.46%	-0.69%

Table 4.14 summarises the results of the same shock, but assuming that labour supply is responsive to the real wage.

Again there is a negative impact on economic activity, but here it is reduced: the impacts on employment and the real wage are smaller than under the perfectly wage-inelastic case, as we would expect. As the real wage increases this induces an extension in labour supply, which moderates the scale of the increase in the real wage and the adverse impact on competitiveness, and so limits the fall in employment. Note that the results only incorporate the supply side impact of the CBI, hence the reduction in all households' consumption.

Table 4.14 The macroeconomic impact of a labour supply shock derived from the microsimulations: a wage elastic aggregate labour supply curve, Policy Option 1 (low-level CBI)

	SR	LR
GDP (£m)	-1.41%	-2.91%
Consumption	-0.34%	-1.30%
Investment	-4.45%	-2.64%
Total Exports	-1.37%	-3.43%
Total Imports	-0.49%	-0.44%
Nominal Gross Wage	5.09%	4.02%
Real take home wage	4.40%	2.73%
CPI	0.66%	1.25%
Real cost of capital	0.48%	0.99%
Unemployment Rate (pp difference)	-2.10%	-1.41%
Employment	-2.41%	-3.10%
Total HH Tax	5.51%	3.27%
Income Tax	2.56%	0.79%
Transfers to HH from Gov	0.00%	0.00%
Real Scottish Government Consumption	0.00%	0.00%
HG1 Lowest income group's consumption	-0.23%	-0.78%
HG2 Second quintile's consumption	-0.24%	-0.97%
HG3 Third quintile's consumption	-0.13%	-1.10%
HG4 Fourth quintile's consumption	0.03%	-1.23%
HG5 Highest income group's consumption	-0.88%	-1.92%

Table 4.15 summarises the impact of adding the demand side impact of the CBI to the simulation reported in Table 4.14.

The small stimulus to demand moderates the scale of the adverse supply effect, but is insufficient to offset it. GDP falls by 2.5% and employment by 3.0%.

The scale of the macroeconomic impact from the micro-to-macro simulation corresponds to the more optimistic results of the macro-to-macro model. The competitive vision of the labour market suggests that the macroeconomic costs of implementing the CBI could be more modest.

Table 4.15 The macroeconomic impact of the demand and labour supply shock (derived from the microsimulations): a wage elastic aggregate labour supply curve, Policy Option 1 (low-level CBI)

	SR	LR
GDP (£m)	-1.30%	-2.53%
Consumption	0.14%	-1.36%
Investment	-3.48%	-2.01%
Total Exports	-1.78%	-3.13%
Total Imports	-0.12%	-0.52%
Nominal Gross Wage	4.74%	3.65%
Real take home wage	-9.75%	-12.14%
CPI	0.80%	1.14%
Real cost of capital	0.60%	0.90%
Unemployment Rate (pp difference)	-1.91%	-1.30%
Employment	-2.39%	-3.02%
Total HH Tax	39.68%	40.78%
Income Tax	78.28%	81.61%
Transfers to HH from Gov	117.37%	117.37%
Real Scottish Government Consumption	0.00%	0.00%
HG1 (Lowest) Consumption	30.24%	29.57%
HG2 Consumption	14.96%	13.90%
HG3 Consumption	3.78%	2.50%
HG4 Consumption	-5.79%	-7.46%
HG5 (Highest) Consumption	-12.28%	-14.20%

4.8 Summary

This introduction of a CBI at scale would represent a significant policy innovation.

However, the macroeconomic impacts of a CBI have rarely been analysed; certainly they are never emphasised as key objectives of the policy.

It is important for overall policy efficacy, to identify the potential impact of the CBI on the macro-economy. If these effects are adverse, the prospect of potential trade-offs between equity and poverty-reduction objectives on the one hand and economic activity/ growth objectives on the other is raised. If the macroeconomic impacts of the CBI are beneficial, the policy offers a "double dividend" – a simultaneous improvement in both distributional and economic growth objectives.

The first finding of our analysis is that the introduction of a CBI has a major progressive redistributive impact, with the incomes and consumption of high-income households falling and those of low-income households rising. In this sense, achievement of the major objectives of the introduction of the CBI seems assured.

This implied redistribution does drive substantial macroeconomic effects, however.

Our analysis of the demand side impacts revealed a number of important features of the CBI.

- A CBI generates a substantial, progressive redistribution of income among households.
- We find that the income-tax financed CBI has a negligible overall impact on demand: the stimulus from the increase in the consumption of lower income households is matched by a contraction in the expenditure of higher income households.
- The impact of the redistribution is governed by the precise spending patterns of household quintiles.
- While the negative effects of the contraction in income and consumption of the higher income groups could be offset by external funding (e.g. through a sovereign wealth fund), the practicalities of this option are clearly limited.
- If the funds increased current government expenditure instead of a CBI, there would be an expansion in economic activity: private consumption here is replaced by government expenditure, which has a lower propensity to import.

A key feature of our results are that they are all associated with a substantial (of over 13%) cut in the real take home wage, reflecting the major rise in income tax rates required to fund the CBI.

Crucial to the final impact of a CBI therefore is the nature and extent of both workers' and migrants' responses to this fall in the net real wage.

In the conventional bargaining model workers' focus on the net of tax real wage so that they respond to the CBI by attempting to restore the initial value of this wage. The resultant "wage push" effect generates a substantial contraction in GDP and employment. The negative effects would be further reinforced by potentially net outflows of migrants, which would reduce labour supply and lead to a further contraction in economic activity.[46]

If, alternatively, workers (and migrants) fully valued their own CBI payments the wage push effect is moderated: workers "only" seek to restore their personal disposable income. The

[46] Matters may be made worse still by the progressivity of the income tax system; the incentives for higher wage earners to outmigration may be significantly greater than for lower wage earners.

effect would be further limited if workers were to fully value their families' receipts of CBI in the bargaining process.

In the limiting "social wage" case it is as if workers (and migrants) value CBI payments irrespective of who they are paid to. In this case workers value the reduction in poverty and inequality and are prepared to help pay for that through higher taxes. Workers (and migrants) are content to accept the substantial reduction in their real take home wage in return for reduced inequality and poverty.

Section 5: Long-term impacts upon households and families

5.1 Methodology

5.1.1 Summary of approach

Stage 1 of the modelling – microsimulation discussed in Section 2 – showed the first-order effects of the Citizens Basic Income Policy (CBI) policy before any behavioural or dynamic responses to the policy from households and firms.

Stage 2 – the economic modelling in Sections 3 and 4 – estimated the *aggregate* effects of these dynamic responses to the policy change.

The intention of Stage 3 of the modelling – a second round of microsimulation – was to show the effects of the aggregate changes identified in Stage 2 on households and families. Of particular interest was whether the long-term macroeconomic effects would change significantly the picture identified in the Stage 1 microsimulation.

The approach taken was to run the microsimulation modelling in a similar way to Stage 1, but with the model dataset adjusted in line with the aggregate estimates produced in the Stage 2 macroeconomic modelling.

The intention was to estimate whether and to what degree these long-term dynamic effects changed the results obtained in Stage 1 for the net costs of the policy, and the effects of the policy on poverty.

5.1.2 Time period

The Stage 2 macroeconomic modelling shows the *long-run* – at least 20 years into the future – aggregate effects of dynamic response to the introduction of the CBI. However, it was decided not to run the microsimulation model forward for another 20 years after 2023/24 for the Stage 3 modelling. This is because the further forward we run the microsimulation model, the greater are the uncertainties as to what will happen to the distribution of income. Essentially, the further forward we take the uprating process described above, the more uncertainty is involved.

Instead, we have taken the long-run aggregate effects estimated in the Stage 2 macroeconomic modelling and applied them in 2023/24. We have taken this approach to show the extent to which the changes estimated in the Stage 1 first order microsimulation

modelling will be ameliorated or exacerbated by the macroeconomic responses estimated in Stages 3 and 4.

This makes this set of results an illustration of the effects of macroeconomic change on households and families rather than a forecast.

5.1.3 Amended Family Resources Survey for 2023/24

As discussed above, the microsimulation modelling takes the most recent three years of Family Resources Survey (FRS) data and uprates it to our chosen policy year by uprating financial values in the data in line with various Office for Budget Responsibility (OBR) forecasts, thereby producing a forecast of an FRS sample for our policy year.

Our approach for the Stage 3 modelling was to produce an altered version of our predicted FRS sample which reflected the long-run macroeconomic outputs of the Stage 2 macroeconomic modelling.

The Stage 2 macroeconomic modelling generates estimates of the likely long-run impact of the CBI policy on:

- Price inflation (Consumer Price Index)
- Wage growth
- Size of the population
- Size of the labour force
- Unemployment rate
- Full-time equivalent employment

For Scottish households, instead of uprating financial values in line with OBR forecasts, amended uprating series were created that produced, by 2023/24, a difference to the OBR forecasts consistent with the estimates from the Stage 2 macroeconomic modelling of the effects of the CBI on the Consumer Price Index and wage growth.

To generate amended population totals, and amended numbers of people in employment, grossing values were altered using a raking algorithm so that weighted results produced from the amended dataset generated population, unemployment, and full and part-time employment totals consistent with the results from the Stage 2 macroeconomic modelling.

This approach is similar to that used in Barnard, Heykoop and Kumar (2018)[47] where estimates from a general equilibrium model of the macroeconomic effects of alternative

[47] Barnard, Heykoop and Kumar (2018), *How could Brexit affect poverty in the UK?*, Joseph Rowntree Foundation, 2018, https://www.jrf.org.uk/report/how-could-brexit-affect-poverty-uk

Brexit trade scenarios were used to alter uprating series and grossing variables to allow a microsimulation-based estimate of the effects of these trade scenarios on poverty.

5.2 Data and modelling approach

5.2.1 Macroeconomic scenarios

In the Stage 3 microsimulation, we modelled three macroeconomic scenarios, all based on the low-level Citizens Basic Income (Policy Option 1):

Table 5.6: Macroeconomics scenarios modelled in Stage 3 Microsimulation

Policy Option 1: with micro-to-macro	Labour supply scenario
Policy Option 1: with Bargaining scenario 2	Macro-to-macro scenario (with migration) with workers' bargaining affected only by their own CBI
Policy Option 1: with Bargaining scenario 3	Macro-to-macro scenario (with migration) with workers' bargaining affected by their family's CBI

The table below shows the long-run macroeconomic effects of the CBI for each of these scenarios:

Table 5.7: Long-run macroeconomic effects of the CBI modelled in Stage 3 Microsimulation

	Policy Option 1: Micro-to-macro	Policy Option 1: Bargaining 2	Policy Option 1: Bargaining 3
Consumer Price Index	+1.14%	+7.16%	+2.58%
Average earnings	+3.65%	+24.50%	+8.39%
Population	0	-10.65%	-4.21%
Labour force	-4.34%	-16.39%	-6.48%
Unemployment	-1.3pp	0	0
FTE Employment	-3.02%	-16.39%	-6.48%

5.2.2 Re-grossing algorithm

The re-grossing algorithm operated initially at adult level and adjusted grossing values in the following order:

Table 5.8: Adult re-grossing algorithm

Step	Title	Coverage (People whose grossing value was changed at this stage of the algorithm)	Control totals used to adjust grossing values
1	Population	All adults	Population change
2	Labour force / inactive split	All adults in the labour force All inactive adults	Change in the size of the labour force
3	Employment / unemployment split	Employed adults Unemployed adults	Change in the unemployment to labour force ratio
4	Full-time / part-time split	Adults working full-time Adults working part-time	Change in the balance between part-time and full-time workers implied by the difference between the change in people in employment and the change in full-time equivalent employment
5	Re-adjust working age / pensioner split	Working age adults Pensioners	Ratio between working age adults and pensioners after Step 1
6	Re-adjust work status groups amongst working age with kids	Working age adults with children	Ratio between full-time workers, part-time workers, unemployed and inactive obtained after Step 4
7	Re-adjust child/childless split amongst working age	Working age adults with children Childless working age adults	Number of children after Step 1

Step 1 adjusts the population in line with any migration/population change outputs from the macroeconomic modelling. Steps 2 to 4 adjust labour market status in line with the labour force, unemployment and full-time equivalent employment outputs discussed above. However, these changes produce alterations to the ratio of working age adults to pensioners and changes to the number of children in the weighted population.

Steps 5 to 7 are intended to ensure that the number of working age adults, pensioners and children in final results are unaffected by the adjustments to employment totals. This was considered to be important in the context of modelling a Citizens Basic Income because the effects of the policy, and its costs, are dependent on the number of people in each of these three age groups.

The final step in the re-grossing process was to produce benefit unit-level and household-level grossing tables by taking the mean values of the new adult-level grossing variables within each benefit unit and household.

5.3 Results

The column labelled 1 in the results table below shows the first-order net costs and effects on poverty of the low-level CBI (Policy Option 1). The subsequent columns show the net costs and effects on poverty when taking into account the macroeconomic changes estimated by the Stage 2 macroeconomic modelling.

Table 5.9: Stage 3 microsimulation results (including taking into account macroeconomic effects)

Summary of macro effects	Policy Option 1 Micro-simulation results	Policy Option 1 (with macro effects)		
		Including income and substitution effects (Micro-to-macro)	Wage bargaining adjusted for workers' CBI (Bargaining 2)	Wage bargaining adjusted for families' CBI (Bargaining 3)
Effect of CBI on no of people in paid work (base = 2,560,000)		-90,000	-420,000	-170,000
Effect of CBI on average wages		+3.65%	+24.50%	+8.39%
Net cost of CBI	-£0.2 bn	-£0.6 bn	-£0.2 bn	-£0.2 bn
Effect of CBI on poverty (base = 1,140,000)	-280,000	-250,000	-280,000	-280,000
Effect of CBI on child poverty (base = 270,000)	-90,000	-80,000	-80,000	-90,000
Effect of CBI on poverty (base = 21.6%)	-5.4 pp	-4.7 pp	-3.3 pp	-4.6 pp
Effect of CBI on child poverty (base = 27.8%)	-9 pp	-8 pp	-6 pp	-8 pp

5.4 Discussion

5.4.1 Net costs

In each of the three macroeconomic scenarios, the CBI causes a fall in employment but an increase in wage rates.

Recall that means-tested benefits have not been abolished under the CBI – just restricted to providing support for housing and childcare costs, and for disabled people. This means that the fall in employment will increase the net costs of the policy because more people will be relying on state support. On the other hand, the increase in wages will increase income tax receipts, thereby reducing the costs of the policy.

The results show that in the case of the micro-to-macro scenario, the former effect will be slightly larger and the long-term macroeconomic effects will have the effect of slightly increasing the costs of the policy. In the two bargaining scenarios, the effects cancel out and the costs will be similar to that suggested in the Stage 1 first-order microsimulation.

5.4.2 Effects on poverty

In all three scenarios, the reduction in the poverty rate falls slightly as a result of the longer-term macroeconomic effects of the policy. In the second and third scenarios there is however some reduction in poverty numbers due to outward migration caused by the macroeconomic impacts of the policy.

5.5 Summary

The overall summary of this stage of the modelling is that, once long-term macroeconomic effects are taken into account, the CBI policy costs about the same or is slightly more expensive, and it is slightly less effective at reducing poverty than suggested by the Stage 1 first-order microsimulation modelling.

Section 6: Conclusions & Policy Implications

This introduction of a CBI at scale would represent a significant policy innovation.

However, the macroeconomic impacts of a CBI have rarely been analysed; certainly they are never emphasised as key objectives of the policy.

Our microsimulation modelling confirms that a CBI would lead to a major re-distribution within Scottish society.

However, it would also carry a price tag. Indeed a high-level CBI involves costs that are so substantial that it is difficult to recover them through the income tax system.

Fiscal neutrality requires income tax rates of 70 per cent on income above £12,444, and 85 per cent on all income above £30,930.

Concentrating on the low-level CBI, very few people will be neutral about the policy – most people will see their incomes go up or down, some quite substantially.

The policy will certainly be redistributive, shifting money from the better off to the least well off. However, it does so in quite an untargeted manner. If the objective is specifically to directly reduce poverty, these results suggest that there are more efficient ways of doing so.

In assessing the impacts upon the economy, we find that what matters most is how workers respond, not just to the change in taxation used to fund the CBI, but the CBI itself.

On balance, the demand side impacts of a CBI are small. All the impact will come through how it will impact upon the supply side of the Scottish economy.

A key feature of our results is that they are all associated with a substantial (of over 13%) cut in the real take home wage, reflecting the major rise in income tax rates required to fund the CBI.

In the conventional bargaining model, workers' focus on the net of tax real wage so that they respond to the CBI by attempting to restore the initial value of this wage. The resultant "wage push" effect generates a substantial contraction in GDP and employment. The negative effects would be further reinforced by potentially net outflows of migrants.

If, alternatively, workers (and migrants) valued their own CBI payments the wage push effect is moderated: workers "only" seek to restore their personal disposable income. An effect further strengthened if workers were to fully value their families' receipts of CBI.

In the limiting "social wage" case it is as if workers (and migrants) value CBI payments irrespective of who they are paid to. In this case workers value the reduction in poverty and inequality and are prepared to help pay for that through higher taxes. Workers (and migrants)

are content to accept the substantial reduction in their real take home wage in return for reduced inequality and poverty.

In summary, a CBI of the scale and coverage proposed in this research would constitute a transformational shift in society. If society's attitudes do not shift with it – i.e. people respond to a major move to tackle inequality by seeking to maintain their net take home wage – then it necessarily follows that it is likely to be a challenge for the macroeconomy. Of course, if society responds differently, then the outcome could be quite different.

Policy implications

Clearly, any government considering implementing a tax-financed CBI would wish to convince society of both the private and social value of the CBI. The objective would be to ensure an outcome much closer to that of the social wage than the conventional bargaining case, and so secure the distributional objectives of the policy while minimising any adverse impact/maximising any beneficial impact on the macro-economy.

This is a major challenge for policy and one that is entirely novel since a genuine CBI has never yet been implemented.

The CBI-like interventions that most closely approximate a substantial, permanent and unconditional CBI are much smaller scale and are effectively externally funded.

We are unaware of any compelling evidence about the likely response of workers to CBI-type interventions. In particular, there is no evidence relating directly to wage responses to a tax-financed CBI. There is some national and international survey evidence that suggests a willingness to pay higher taxes, but this is typically linked to the provision of improved public services rather than a substantial shift in the distribution of income.

Societal change on the scale anticipated appears to necessitate the establishment of a kind of "social contract". Ensuring that workers fully understand the value of CBI payments to themselves and their families appears more straightforward.

Clearly, there may be a number of things that policymakers could attempt to do to encourage support for a CBI. First, set out all of the potential advantages of a CBI – to individuals, families and to society. The latter includes reductions in income inequality, poverty and precarity and a range of other potentially well-being-enhancing outcomes. Ultimately however, this is a political decision and people will take different views on the merits of all this.

Second, while a substantial rise in income tax rates is also required to ensure that the CBI is fully funded efforts could be made to limit the scale of this. This could occur through adjusting

the scale of the CBI. Alternatively/additionally, using other sources of funding may limit the rise in income tax, although there is no costless alternative.

Third, policymakers could seek directly to influence the response of the wage bargaining system. However, a high degree of centralisation in the bargaining system would seem to be required. A second way to influence the bargaining process would be through a direct wage (and price) restraint policy. Again, this would necessitate some kind of social contract.

Fourth, the Government could endeavour to maximise the other supply side benefits that may be generated by the CBI. These could include, for example, the provision of training opportunities and general uplift in human capital to help boost productivity.

In conclusion, the introduction of a CBI would represent a major societal innovation that would undoubtedly convey significant benefits in terms of its primary objectives of reducing inequality and poverty, and very probably also in terms of a range of other desirable outcomes (including improved mental health and productivity). However, our analysis shows that under certain circumstances it may have significant adverse macroeconomic impacts. Understanding these impacts, and their transmission mechanisms, will be a crucial part of the policy development process.

Annex A: Literature Review of Citizen's Basic Income

Introduction

Since the financial crash of 2007/08, and the austerity agenda, welfare cuts and benefits reforms that followed, interest in the concept of a citizens' basic income has increased. With significant economic challenges and transitions facing Scotland, the UK and the wider world - including automation, ageing and the urgent need to decarbonise our economy - radical new ideas that could reshape peoples' relationship with the state and with work are gaining support across the political spectrum (Martinelli 2017a).

In their most basic form, basic income schemes constitute a regular payment made to every individual in a society, regardless of their personal circumstances, at a rate designed to achieve at least a basic standard of living. The concept of a basic income as we understand it today was first articulated in the mid-20th century, but some of the earliest conceptions can be traced back to the time of the first industrial revolution.

In Scotland, interest in a basic income has accelerated over recent years. In May 2018, the Scottish Government confirmed plans to fund a number of feasibility studies that would assess whether a basic income scheme could be piloted in Scotland (Barcley et al. 2019). The announcement was built on several years of research and work by organisations such as Citizen's Basic Income Network Scotland (CBINS), the Fairer Fife Commission and The Scottish Basic Income Pilot Steering Group, the latter set up in November 2017 in order to assess coordinate feasibility studies of a basic income pilot in Scotland.

This literature review seeks to understand the family of proposals that make up citizens' basic incomes, to outline a brief history of thinking around basic income schemes, learning from basic income trials to date, and to identify key questions in relation to designing a citizens' basic income in general, and particularly in the Scotland context.

What are Basic Income Schemes?

The principles of a basic income scheme are relatively straightforward and indeed, for many, this is one of its key attractions.

Definitions of a basic income

Philippe Van Parijs in his 1992 paper "Competing Justifications of Basic Income" cites the "beautifully, disarmingly simple idea" of "an income unconditionally paid to all on an individual basis, without means test or work requirement" (Van Parijs 1992). Van Parijs reinforces the distinction between basic income and other forms of income assistance by stressing that payment is made:

1. "to individuals rather than households;
2. irrespective of any income from other sources; and
3. without requiring any present or past work performance, or the willingness to accept a job if offered." (ibid)

These tenets of basic income (individual, universal, unconditional) have more recently been developed further by the Basic Income Earth Network (BIEN) who define basic income as having the following five characteristics:

1. "Periodic: it is paid at regular intervals (for example every month), not as a one-off grant.
2. Cash payment: it is paid in an appropriate medium of exchange, allowing those who receive it to decide what they spend it on. It is not, therefore, paid either in kind (such as food or services) or in vouchers dedicated to a specific use.
3. Individual: it is paid on an individual basis—and not, for instance, to households.
4. Universal: it is paid to all, without means test.
5. Unconditional: it is paid without a requirement to work or to demonstrate willingness-to-work. (BIEN, 2019)"

In referencing basic income schemes, multiple terms and acronyms have emerged including Basic Income (BI), Universal/Unconditional Basic Income (UBI), Citizens Basic Income (CBI) or simply Citizens' Income (CI). Although the addition of words such as "universal", "unconditional" and "citizens'" would suggest divergence in terms of each of these systems, in practice these terms are often used interchangeably.

Motivations for introducing a basic income

Where the principle of a basic income scheme appears fairly intuitive, the theories motivating advocates of such schemes are varied. Throughout the literature there are broadly three key (overlapping) motivations for introducing a basic income: as a tool to respond to the social challenges stemming from the changing nature of work (Srnicek and Williams 2016); as an empowering social security system (Murphy 2015); and as a means of reducing poverty and improving health and quality of life (Lowrey 2018; Bregman 2017).

As a response to automation and a changing labour market

For some, basic income schemes can address crucial labour market deficiencies such as increasing job insecurity and "the threat of mass job losses due to automation" (Gibson et al. 2018; Ford, 2018; Walter, 1989). As technological developments enable a growing share of tasks previously performed by humans to be automated, some proponents argue that automation will lead to displacement on such a scale that requires a fundamental rethink of society's relationship with work (J. Andrade et al. 2019; Van Parijs & Vanderborght 2017). Against this backdrop, some advocates see in basic income schemes the potential to reconstruct society in a manner that prioritises citizen's well-being over increases in national economic productivity, allowing people to undertake fulfilling paid and unpaid work as they want, rather than as they need (Mays 2019).

As a means of empowering people within the social security system

A related but separate motivation for some that propose a basic income, is to ensure the social security system is reformed to provide a basic standard of living to all, without infringing on individual's privacy or dignity. Furthermore, proponents of a basic income see it as a route to a more empowering and dignified form of social security, avoiding the perceived pernicious effects of means-testing, conditionality and sanctions, most notably characterised within the UK's Universal Credit system. Indeed, the roll-out of Universal Credit across Scotland and the UK has coincided with increasing interest in the concept of a basic income, given a basic income avoids means-testing, conditionality and sanctions (Torry 2018). In these ways, basic income schemes could create a raft of benefits outwith the workplace, with greater numbers of people able to enjoy freedom to pursue personal and self-fulfilling aims and ambitions, and to make choices of their own rather than choices based on conditions set by the welfare state (Walker 2016).

As a means of poverty reduction

Equally, for others, basic income could have important distributional effects. For example, Emery et al. suggest basic income schemes could "prove to be a highly efficient anti-poverty strategy" (Emery et al. 2013). Poverty reducing effects are anticipated from the basic income itself, but the fiscal reforms required to pay for it are also identified as an opportunity to deliver far-reaching income redistribution, with many proponents seeing significant and progressive tax changes implemented hand in hand with a basic income (Murphy 2015).

In-work poverty has become a defining characteristic of poverty in Scotland as across the UK in recent years. As of 2017/18, nearly 4 million workers in the UK were classed as being in poverty, with this representing 1 in 8 members of the workforce (Piercy 2019). In Scotland, more than half of people living in relative poverty in 2017/2018 lived in a household where at least one person was in employment (ScotPho 2019). Advocates for basic income suggest that it represents a modern solution to the modern experience of poverty. By promoting a basic income set at a level that will at least cover the costs of peoples' basic needs, and by implementing redistributive tax policy to help to pay for it, proponents see a basic income as a potentially important tool in reducing if not eradicating poverty (see below for consideration of evidence in favour and against this view).

The guiding principle behind this rationale is that work should always pay, with extra hours worked being fairly rewarded without compromising other sources of income (Horstmeyer 2017). Under Universal Credit, additional earnings from work (above a given work allowance) are associated with steep rates of benefit withdrawal (Corlett 2019). Equally, income volatility can be exacerbated by income assessment mechanisms that are particularly sensitive to fluctuating earnings – seeing benefit entitlement potentially varying drastically month by month.

Under basic income schemes, supporters argue that many of the disincentives to taking on greater numbers of hours or higher paid work would be reduced if not removed entirely (Torry 2018) (Horstmeyer 2017). With the reliability of basic income payments, recipients could be incentivised to take on more hours of work and may have greater income predictability. In other words, basic income would provide an avenue to increased labour market participation amongst previously neglected groups, and would provide greater financial stability for those unable to constantly reassess their place in a means-tested benefits system.

Similarly, advocates of basic income view the reliability of the payment as a key means of better supporting those in precarious work, including agency workers and workers on zero-

hours or temporary contracts (Evans 2019). It is likely, however, that the effectiveness of basic income would depend heavily on the design of a particular scheme.

Furthermore, many see the potential for a basic income to improve social outcomes, including educational and health outcomes, alongside a reduction in criminal activity (Gibson et al. 2018). By freeing people from the *need* to work through covering their basic needs, proponents argue that basic income recipients will be able to focus on what they wish to spend their time doing, leading to improvements in levels of overall wellbeing, quality of life, and with that a variety of other key outcomes (Walker 2016).

Support for basic income

Advocates and detractors of basic income schemes come from across the political spectrum. Although most heavily associated with left, liberal and green political parties, basic income policies are proving particularly popular with new political parties emerging across the globe (Standing 2017). Advocates also include, in smaller numbers, representatives of centrist and right-wing politics including utilitarians, libertarians and conservatives. Indeed, in the historical context Milton Friedman, widely recognised as one of the leading thinkers driving neoliberalism, was an early proponent of a basic income for all (albeit to drive more efficient distribution of public services than driving redistribution and a narrowing of inequalities).

De Wispelaere and Stirton (2013), both long-term advocates of basic income schemes, note that one of the key distinctions between left-wing and right-wing models lies in the perceived benefits of reduced administration. For left-wing advocates, basic income models should be built from a "*redistributive perspective*", prioritising a bureaucracy in a "minimal intrusion sense since the relevant forms of intrusion and inconvenience fall disproportionately on the most disadvantaged claimants" (ibid). For advocates on the right, savings in terms of overall bureaucracy are suggested as "benefiting the whole population", with an "*aggregate model*" viewing the diminishing returns of investing in an administration that means-tests disadvantaged claimants as a fundamental weakness of current welfare programs (ibid).

Other Types of Basic Payments

There are a number of proposed schemes that sit within the family of basic income schemes, but that do not meet one or more of the aspects of a basic income outlined above.

Conditional Cash Transfers

First amongst these is Conditional Cash Transfers (CCTs), a model of anti-poverty policy which requires recipients in receipt of payment to carry out certain activities aimed at reducing poverty amongst families and, in particular, children (Morais de Sá e Silva 2017). A notable example of this popular type of anti-poverty intervention is the *Bolsa Família* program operated by the Brazilian government since 2004. Representative of most CCTs, the *Bolsa Família* deviates from a basic income scheme in that it is targeted only at those living in poverty (non-universal) and requires recipients to make "investments in human capital, such as school attendance by children and adolescents, complying with children's immunization schedules, prenatal care for pregnant women and health monitoring for children under five" (conditional) (Britto & Soares 2011). CCTs such as the *Bolsa Família* are often paid at the "family" or household level (non-individual) (ibid).

Negative-Income Tax Schemes

Negative-Income Tax schemes (NITs) in many ways share a close association with basic income schemes, with the terms often used interchangeably, notably in Canada where a NIT version under the name 'basic income' has been under discussion among policymakers (Widerquist 2018). In practice, NIT is a payment or rebate that replaces most other existing social security payments with a single payment that supplements the income of lower earners. The payment is withdrawn as earnings increase, through the tax system, reducing the risk of 'benefits traps' or 'cliff-edges' where people experience high effective marginal rates of tax as their earnings increase (Bowman 2014).

Advocates of basic income schemes point to three key distinctions that restrict the comparable positive impacts of NIT schemes. Firstly, like CCTs, NIT schemes have historically taken household rather than individual income as the measure by which payments and taxation are assessed (non-individual) (Van Parijs & Vanderborght 2017). However, this may depend on the income tax system in operation in a given country. Secondly, under most schemes, NIT would be paid at the end of the tax year based on income earned during this period (non-periodic). Thirdly, while offering a universal minimum, NITs are only paid to the lowest earners in effect making them a means-tested scheme (non-universal) (Standing 2017).

For supporters of a basic income, the implementation of such a scheme would negate a great deal of the positive symbolic effects of a basic income as a vehicle to achieve greater social justice.

As Van Parijs & Vanderborght argue:

"What our societies need for the sake of freeing everyone from poverty and unemployment, and what those committed to freedom for all should fight for, is a floor on which all can stand, not just another, more sophisticated policy targeted at the poor" (Van Parijs & Vanderborght 2017).

Finally, the operation of an NIT scheme through existing income tax administration would require individuals to already be engaged with such an administration potentially risking the take-up of payments amongst the unemployed or undeclared workers may be significantly lower than under a basic income scheme (Standing 2017).

Basic endowment

The final group of models associated with basic income is the 'basic endowment' or 'basic capital grant'. Proposals for a basic endowment usually mirror the criteria of basic income schemes as outlined above except in terms of the frequency of payment. Instead of a regular payment to every citizen (weekly, monthly, quarterly, etc.), a basic endowment would be provided to every citizen on a one-off or irregular basis (non-periodic). As a working paper from the IMF suggests, such a payment "may be regarded as serving the purpose of improving equality of opportunity at an early stage of life" (Francese & Prady 2018).

Two heavily cited policy proposals for basic endowments have come from Ackermann and Alstott (2004) and A.B. Atkinson (2014). In the former, Ackermann and Alstott's (2004) proposal for a basic endowment or "stakeholding" payment includes a stake of $80,000 (USD) being provided to every "liberal citizen" at the age of 21, on condition that individuals have achieved a high-school diploma and have no criminal record

A.B Atkinson proposed that a similar model be translated into the UK context, whereby the payment of a 'capital endowment' would be provided to all "either at adulthood or at a later date" (2014). Building on Atkinson's work, the Institute for Public Policy Research (IPPR) has proposed the creation of a 'Citizen's Wealth Fund' with one recommendation to pay a "£10,000 capital dividend for all 25-year-olds by 2030" (Roberts & Lawrence, 2018).

Key design choices and issues for a Scotland CBI

While the definition of a basic income is clear, few of the pilots that have been implemented fully meet this definition (see annex for an outline of a number of basic income or related case studies). However, even if the definition of a basic income were to be fully met in any pilots in Scotland, there are a number of design choices, and potential trade-offs associated, in developing a basic income to be piloted, including in Scotland (Francese & Prady 2018).

Full vs partial basic income systems

A crucial aspect in designing a basic income model is in how far it replaces existing social security provision, with distinctions made between 'full' basic income schemes, that replace all or almost all cash benefits, and 'partial' schemes that retain some means-tested support or sit alongside the existing social security system (BIEN, 2019; Van Parijs & Vanderborght 2017; Standing 2017). Within the context of Scotland's social security powers, some of which are devolved to Holyrood and the majority of which are reserved to Westminster, there are additional considerations that might shape the design of a basic income administered in Scotland.

Some critics of a 'full' basic income argue that replacing all current means-tested supports would lead to "unacceptable household losses", leading some disadvantaged groups to fall – or fall deeper – into poverty. Yet, the alternative option of providing an adequate universal payment whilst maintaining additional payments to disadvantaged groups would, even in the eyes of many supporters, "simply cost too much" (Martinelli 2017a). In response to this intrinsic challenge, a number of basic income proponents advocate for an initial period of 'partial' basic income implementation, during which some means-tested support would be continued before being phased out over time, with the ultimate goal being that no one currently receiving benefits would be worse off than before (Standing 2017).

Partial schemes are also often proposed as a way of at least retaining premiums related to disability, means-tested housing and childcare costs. However, the more partial the scheme (i.e. the more of the existing social security system that is maintained), the less impact it might have in delivering against the intentions for a basic income (Haagh and Rohreggar 2019). In particular, for those advocates who see a basic income as a route to a simplified and dignified social security system, retaining much of the social security system defeats the purposes of the basic income. Some argue partial schemes would fail to realise the "drastic reductions in bureaucratic complexity" proposed in full schemes (Martinelli 2017a). Similarly, others argue the unconditional element of basic income is lost when a scheme operates in conjunction with welfare states predicated on "willingness to work" requirements (Walker

2016). This element is heightened by the fact that most partial basic income proposals are, by definition, based on amounts of payment that are insufficient to live on as a sole source of income.

Public support in roll-out

Some advocates of UBI argue that social security provision based on universal entitlement would boost social cohesion by eroding notions of who is 'deserving' or 'undeserving' of social support (Painter et al, 2019). Although advocates argue universal coverage may reduce bureaucracy and administration costs over the long run, there is a significant political challenge in the immediate term to convince politicians and the public that everyone is equally deserving of a basic income (De Wispelaere & Nouera 2012). Likewise, where a partial programme has been rolled out and the rationale underpinning eligibility has not been clearly understood, basic income schemes have been found to damage social cohesion. For example, the rushed roll-out of partial basic income schemes such as the Indonesian Bantuan Langsung Tunai (BLT) Direct Cash Transfer programme have resulted in a "lasting erosion of trust in all levels of government", with non-recipients withdrawing from community projects and related engagement (Keating et al. 2015; Gibson et al. 2018).

In order to overcome this challenge, it has been suggested that any UBI scheme could provide support to "one demographic group at a time" (Torry 2018). This would see a phased roll-out based on age groups, beginning with groups that the public might regard as being more 'deserving' of social support, so that each group's roll-out can pass a "behavioural feasibility test", building public and political support for a full roll-out. Typical age groups that could be considered for the initial phases of any rollout might include "young adults and pre-retirement working-age adults" (ibid). Torry argues that a phased roll-out would further support workable transitions from tax allowances and means-tested benefits towards unconditional and nonwithdrawable benefits (ibid).

Defining universality

Despite its apparent simplicity, the concept of basic income as a payment made to each individual within a society also demands design choices. Firstly, there is a decision about how to define beneficiaries: what (if any) criteria identify the eligible population, and whether the basic income design incorporates any degree of targeting or additional or higher payments (for example, based on additional need or relative social position). In the Scotland context, we might expect these design choices to relate in the first instance to questions of residency, migration or citizenship status and – for the purposes of a pilot – internal migration within the UK.

If a definition of eligibility is based on residency, there remain questions as to how far that eligibility is extended or circumstances in which it could be rescinded. Does a recipient who moves out of the trial area continue to receive the payment, and likewise, does someone moving into the trial area begin to receive the payment?

Alternatively, if based on citizenship, there is a design choice with regards to who is perceived to be an eligible citizen. For example, some basic income proposals and trials have placed further behavioural conditions on eligibility such as absence of a criminal record, or school attendance (Ackermann and Alstott 2004) (Silva and Lima 2019).

Size of payment

There are a number of design choices and trade-offs in determining the size of any basic income payment.

- *Impact vs. affordability*

Firstly, there is the question of the amount paid to recipients. Basic income concepts often described the sum of income paid as basic, modest, or enough to provide economic security sufficient to ensure survival (Bregman, 2017; Standing, 2017). There is, however, a clear trade-off between the affordability, or indeed feasibility, of basic income, and its impact in designing the level of payment. While a small basic income might be politically or economically more feasible, it may make little impact on an individual's life – whereas a more generous payment may make a significant difference to the lives of recipients, but may not be affordable (Fitzpatrick, 1999; Van Parijs & Vanderborght, 2017).

The case for a payment adequate to eliminate absolute poverty have been countered by the argument that too great a payment could create work disincentives that would fundamentally distort the labour market and, consequentially, the tax base that any basic income scheme is necessarily funded from (Francese & Prady 2018). Within the context of Scotland's fiscal framework and the revenue-raising powers available, these considerations are likely to be even more pressing.

Crucial to this affordability argument, and often crucial to any distributional effects of a basic income, is how a basic income is paid for. Those paid for through dividends from collective resources, such as fossil fuels, may be seen as more affordable but are less likely to have the strongest distributional effects. Alternatively, those basic incomes that are combined with significantly progressive income or wealth tax changes may have the advantage of strengthening the distributional effects of a basic income proposal, but may have the drawbacks of being seen as less affordable.

- *Differentiation by age*

There is also the question of whether a payment should vary by age. While we might expect a basic income design to see the same payment made to every recipient, there are important challenges raised in relation to both children and people of retirement age, who under the current social security system would ordinarily be entitled to a state pension and not expected to supplement their income through paid work. Under a full basic income, an income would be expected to be sufficient to protect against destitution in retirement. Some basic income designs therefor advocate for a lower payment for children, paid to a parent or carer through childhood, and for a premium payment for people of retirement age (see Standing, 2017; Van Parijs & Vanderborght, 2017). This logic raises further questions, too, with regards to people who are not able to supplement their income through the labour market – including some case of disability, injury or chronic ill health, or full-time carers.

The mechanism through which payments are made can be expected to have consequences too. There are design choices to consider with regards to whether payments are definitively universal, as Standing and others have advocated for, including payment to all children. But there are questions of capacity and capability to consider, where how a payment is made may differ on the basis of dependency – for example where payments are made to a child's parent. These could be considered within the design of the payment – with payments bundled and made to an assigned carer, or they could be made individually, with responsibility for accessing and spending money in cases of diminished capacity left to existing structures. Whether payments are bundled or made directly to individuals within a household could also be expected to make a significant difference to outcomes, as evidence heard on the decision to enable split payments for Universal Credit recipients in Scotland has found (Scottish Government, 2018).

- *Differentiation by geography*

Thirdly, there is the question of differentiation by geography. Recognising the variable cost of living across different areas and regions, some advocates have made the case for income varying on the basis of where people live – particularly by urban or rural location (Van Parijs & Vanderborght, 2017). Critics of a universal basic income's power to reduce poverty in the UK have pointed to variable housing and childcare costs as clear cost barriers that would persist for families in receipt of the payment, while means-tested support may be withdrawn (Goulden 2018).

- *Equalities Groups*

There are further design issues relating to how far a basic income can or should seek to redress existing structural inequalities between different groups. In this vein, a number of feminist arguments have been made for and against basic income. Some feminist advocates argue that basic income could provide a means of compensation for women's unpaid work, recognising that women are disproportionately responsible for unpaid care work. Indeed, some scholars have pointed to feminist "wages for housework" campaigns of the 1970s as early articulations of demands for basic income (Huws 2017). Some feminist utopian visions of an unconditional basic income suggest its introduction could go some way to address the structural economic disadvantages women currently face within capitalist societies, arguing that a future in which going out to work was non-essential could lead to a re-evaluation of care work, potentially improving pay and conditions within formal care workforces which are both heavily feminised and characterised by low pay.

Others, meanwhile, have argued that the individual payment design of basic income would offer women greater financial agency and greater bargaining power within the family. These arguments rest on a critique of contemporary social security provision in its structural reliance on the family unit, under which social assistance is offered to women in relation to their roles as carers for children, or second earners to the (most often male) primary breadwinner (McKay and Vanevery 2000; Webster 2019).

Feminist *critiques* of basic income have also evolved over the last decade. These range from critiques of arguments for a basic income as blind to the gendered nature of capitalist market structures (McKay 2007) to concerns that a basic income might pressure some women with caring responsibilities to withdraw from paid labour – a concern that has been heightened by evidence of how the design of Universal Credit has disincentivised second earners to enter or take on more paid work (Lister 2017). Some feminist scholars have argued basic income does not, by its unconditional nature, adequately value or remunerate women for unpaid care work, and that without other measures it fails to address the deeply gendered gap in care provision, or to associated pay gap. Feminist perspectives advocating for and against basic income are often heavily reliant on assumptions about how work incentives are affected by the introduction of a UBI, as so we might expect gender effects to play out differently under different basic income designs.

As McLean and McKay (2015) argue, it is important for debates on the equalities impact of basic income to move beyond gendered division of labour to consider other forms of disadvantage and oppression encountered by women with intersecting identities (Reynolds 2017). This is particularly pressing with regard to the design of a basic income when it comes

to disability and childcare – both of which may reduce an individual's ability to enter and sustain paid work. If a basic income scheme proposed to take the place of other social security entitlement, a key test may be its ability to provide an adequate income for those furthest away from the labour market. Here, those who are unable to work due to illness or disability and lone parents with pre-school age children are two key groups to consider in the design of a basic income scheme.

Modelling the effects of a CBI to date

In exploring the feasibility of both full and partial schemes in the context of the UK, a small number of existing studies have simulated the revenue and distributional effects of various basic income designs.

Institute for Policy Research

Chief amongst these is the Institute for Policy Research (IPR) working paper by Martinelli (2017b), which considers over 30 basic income designs in the UK context, including full and partial designs. Amongst the full schemes modelled, variation is mainly concerned with the level of payment and includes design iterations based on matching existing benefit levels, providing premiums for certain groups or on predicted increases in tax revenue derived from scrapping the personal allowance (ibid). Within partial schemes, design largely varies by coverage, with different iterations targeting a range of groups including young adults, the working age population, and pensioners to different extents. Given historically high child poverty rates in the UK, generous payments targeting children were maintained across most designs. While the research acknowledges limitations in how the designs modelled addressed some vulnerable groups and incorporated potential behavioural changes, the paper's core finding is that none of the basic income designs modelled were able to alleviate poverty whilst also retaining simplicity and work incentives in a cost effective manner (ibid).

Compass

In a publication produced for Compass, Lansley and Reed (2019) "examine two complementary steps to establish a basic income system" in the UK.

Model 1 is based on a partial basic income scheme implemented in a single parliament. The model varies basic income payments by age, with weekly payments of £40 for children, £60 for adults under the age of 65 and £175 for those 75 and over. Model 1 operates in conjunction with the abolition of child benefit and the state pension alongside a reduction in

means-tested state benefits. The gross cost associated with the model is £300.2bn per year. The scheme is presented as cost neutral on the grounds that it incorporates a number of parallel tax reforms that are revenue-raising, including the removal of the personal allowance and national insurance and income tax rises. The revenue raised through tax changes is £182bn per year, with the revenue raised through benefit changes totalling £118bn per year. Effects on relative poverty are detailed by age group. Child poverty drops by 10.6% (18.1% from a base of 28.7%). Working-age poverty falls by 4.5% (15.7% from a base of 20.2%). Pensioners poverty drops by 4.9% (11.3% from a base of 16.2%). Figures for effects on absolute poverty are not provided. Finally, effects on inequality are represented of drop of 0.04 on the Gini coefficient (0.337 from a base of 0.377) (where 0 is complete equality and 1 complete inequality).

Model 2 represents a more costly basic income design, with weekly payments set at £50, £80 and £180 for children, the working-age population and pensioners respectively. This is estimated to require an additional £26bn of spending on top of Model 1. To afford this, Lansley and Reed propose a citizen's wealth fund, built up from a mixture of long-term bond issuing, transferring the public asset base and a consistent investment of revenue over the period. A fund equal to £650bn would be required to afford meet the additional annual cost, with an estimated 20-year accumulation period assumed prior to implementation (ibid). The effects in terms of relative poverty are once again detailed by age group. Child poverty drops by 13.1% (15.6% from a base of 28.7%). Working-age poverty falls by 5.7% (14.5% from a base of 20.2%). Pensioners poverty drops 5.4% (10.8% from a base of 16.2). Again, absolute poverty figures are not provided. The effect on the Gini co-efficient is a drop of 0.048 (0.329 from a base of 0.377).

Reform Scotland

Mackenzie et al (2016) produced a paper for Reform Scotland which modelled the effects of the Scottish Greens' proposal to provide a weekly basic income of £50 for children and £100 for adults. The gross cost of implementing such a scheme in the Scotland was estimated at £20.4bn. The paper suggests that this could be partially afforded by raising an estimated £14.74bn in additional tax revenue and £3.6bn through benefits savings (albeit through tax and benefit powers currently not devolved to the Scottish Parliament). Proposed tax and benefit changes include scrapping certain benefits, the removal of the personal allowance, an 8p flat rise across all income tax brackets, and plans to combine National Insurance and income tax schedules. This would see taxpayers pay a single rate of 40% tax on income between £0 - £41,786, 60% on income between £41,787 - £150,000 and 65% on anything above. No figures were provided referring to the effects of the basic income on absolute and

relative poverty, or in terms of inequality. However, the paper does detail the effects on individual incomes after implementing the scheme saw gains go to people earning below £26,000 and losses for anyone earning above this sum, with the biggest winners being those with the smallest incomes.

Royal Society of Arts

More recently, Painter et.al (2019) produced a paper for the RSA detailing two separate models for basic income, specifically addressing Scotland. The first simulated model is based on three separate age-related payments: £58 per week for children; £92 for the working age population; and £169 for pensioners. Unlike many other proposed basic income models, the personal allowance is retained, but reduced to £1,500. National Insurance is also retained, but with primary (£1,500) and upper (£43,430) thresholds reduced and rates applied above each of these limits at 12% (as is currently the case) and 4% (a rise of 2%) respectively.

Income tax rates on gross income are adjusted as follows:

Gross Income	Income Tax Rate
£1,500 - £14,549	19%
£14,549-£24,944	21%
£24,944-£43,430	23%
above £43,430	42%
above £75,000	50%

The second model operates on the same basis, but retains the current income tax schedule and a lower basic income payment of £46 per week for adults and £29 for children. Painter et.al (2019) argue this would see the existing tax savings made through Income Tax and National Insurance allowances paid out in a cash sum.

Both models are suggested as being to the benefit of society as a whole, and to those most in need in particular. Details on the effect of each model on relative poverty rates at a household level are provided, alongside a breakdown in terms of age group. All relative poverty rates detailed in the paper are measured before housing costs are taken into account. Household poverty drops by 5.3% drop (13.5% from a base of 18.8%) under model 1 and 1.6% drop (17.2% from a base of 18.8%) under model 2. Child poverty falls by 5.9% (12% from a base of 17.9%) under model 1 and by 1.7% (16.3% from a base of 17.9%) under model 2. For adults, a drop of 5.7% (10.3% from a base of 16%) is registered for model 1 and a fall of 1.8% (14.1% from a base of 16%) for model 2. Pensioner poverty falls by 5.4% (10.8% from

base of 16.2%) in model 1 and 1.4% (14.8 from base of 16.2) in model 2. Significantly for the authors, the rate of destitution[48] in Scotland is halved under the second model and *eliminated entirely* under the first model" (ibid). Although no direct figure is referred to in terms of inequality, positive changes for those with the lowest incomes are acknowledged in both models.

The funding gaps associated with both models, however, are considerable. The gross cost associated with both models are not detailed. Instead, net costs are provided. The second model would require an additional £1.9bn in spend per year, and the first model an additional £9.6bn per year. For the authors, the scale of the latter figure means that first model should be considered a "longer-term proposition" with reforms over "a number of five-year parliamentary sessions" required to make it a feasible prospect. To cover these gaps, the authors turn to a number of prospective revenue generators predicated on a series of ambitious assumptions. These include an average growth of 2% in GDP over the first 10 years of the scheme, greater powers being devolved to Scotland in terms of tax and expenditure and a consistent Barnett formula being applied.

Conclusion

The simple idea of a basic income paid regularly to all has gained a great deal of interest in recent years. As we look back on the over a decade since the financial crash, the resultant public and benefit spending cuts, alongside benefit reforms and roll-out of Universal Credit and increases in insecure work and as we look ahead to automation and technological change, many see basic income as a proposal which has come of age.

This literature review has considered some of the key definitions of a basic income, and other forms of basic payments, and has also outlined some of the pilots and practical applications of basic payments that have taken place in the past and are in existence to this day.

Without question basic income has a simplicity that has helped it to gain support as a potential policy prescription to many of the challenges we face today. However, while simple in terms of definition, it seems clear a basic income is far from simple in terms of application. In designing any basic income scheme in Scotland there remains a number of key choices and

[48] The paper cites the The Joseph Rowntree Foundation's definition of destitution:

""Destitution means going without the bare essentials we all need. That's a home, food, heating, lighting, clothing, shoes and basic toiletries. We define destitution as when people have lacked two or more of these essentials over the past month because they couldn't afford them; or if their income is extremely low – less than £70 a week for a single adult" (Goulden 2018).

potential trade-offs in turn, some intrinsic to any scheme others related to how any pilot or scheme is rolled out. These include whether a basic income operates alongside or instead of (parts of) the social security system, defining universality, how it is rolled-out to avoid resentment, and of course the size of any payment.

Linked to many of these is the question of how a basic income could be paid for. Few if any of the basic payments piloted in practice have seen resultant changes to taxes (see annex). Where they have, such as in Alaska, the basic payment has been paid for through indirect taxation, rather than through the progressive income tax changes proposed by many advocates of a basic income. Any basic income pilot in Scotland designed to have distributional effects that narrow income inequalities would need to consider the potential effects of tax changes, as much as the effects of any payment itself – in essence how a basic income could be paid for, by who and with what effects.

Note: Existing Basic Income Schemes and Pilots

Where have basic payments been implemented?

Globally, basic income initiatives and the debate that surrounds them have taken place over two distinct periods. The first wave occurred between 1968-1980 and was marked by five NIT trials (loosely defined as Basic Income Guarantee experiments - see Widerquist 2018) in the United States and Canada. The second and current wave has taken place from 2008-the present day and is typified by a raft of new policy experiments and proposals seeking primarily to address inadequate welfare state provision in numerous countries (ibid). Pilots and proposals in this second wave are typified by a closer alignment to the basic income tenets as set out above, although none can be said to be based on a full basic income scheme. Instead, a number of compromises are shown to be necessary to at least enact partial basic schemes.

The First Wave – NIT trials (1968-1980)

- The Income Maintenance Experiments – 1970s

The largest of the NIT trials conducted during the first wave were the Seattle/Denver Income Maintenance Experiments (SIME/DIME). For those families that received NIT benefits, 11 different plans were applied with three levels of NIT annual payment ($3800, $4800 and $5600) and varying levels of "take-back rates" as income rose (ibid). Families selected for the trial included black, white, and Latino families with at least one dependent and household incomes below $11,000 for single parents [and] $13,000 for two-parent families (all figures as of 1971) (ibid). In total, 4800 low-income families took part in the trial, with just under 60% of families receiving financial payments, with the remainder acting as a control group (Spiegelman & Yaeger 1980). The trials began in 1970 and lasted until 1976, although a small number of families continued to receive NIT benefits up until 1980. Families were enrolled on a 3-, 5- or 20-year basis, although the latter group did not complete the full term as the trial was prematurely concluded.

Much of the media and political coverage of these trials have focussed on negative labour market outcomes. Advocates of basic income initiatives have argued that this reading was fundamentally a problem of interpretations, making the case that the experimental group's labour "reduction" was only a *relative* reduction in comparison to the control group, and many "substantial and encouraging" quality-of-life indicators were overlooked by lay commentators (ibid). Additionally, supporters argued that the 5-7.9% reduction in labour-time between treatment and control groups would not necessarily be replicated on a

national scale, particularly given many participants were working less only in order to spend more time looking for other jobs. Nevertheless, this sizeable reduction (combined with a higher divorce rate amongst the treatment group) largely dictated the negative narrative that formed around the trials (Widerquist 2019).

- Alaska Permanent Fund Dividend (1982-Present)

The Alaskan Permanent Fund Dividend (APFD) has been cited as the longest standing 'Basic Income-like' intervention in the developed world (Painter et al. 2019). Since 1982, the scheme has entitled all Alaskan residents to a share of the state's revenues from oil production. As of January 2018, the overall fund was worth approximately $66 billion, with around almost 630,000 people of all ages, who have resided in Alaska for at least a year, receiving a payment of around $2,000 per annum (Jones & Marinescu 2018) (Berain Garza 2018).

For many, the fund is not only the longest-standing example of a basic income scheme but also one of the most successful. Separate studies have noted that the dividend has had the effect of at least mitigating if not reducing poverty, especially amongst certain rural and Indigenous populations, while also maintaining labour market participation, with a small increase in part-time working amongst recipients (Berman 2016) (Berman 2018) (Jones & Marinescu 2018). However, overall poverty rates have continued to rise in recent years despite the existence of the payment (Berman 2016). As Gibson et al. highlight, such effects may be attributed to the fact that the APFD was not actually designed with the aim of reducing poverty or income inequality, but with the dividend originally implemented "in conjunction with the abolition of state level income taxes" (Gibson et al. 2018). The APFD may therefore be an example of a basic payment but it was not implemented alongside progressive tax reforms to pay for it (instead paid for through income from natural resources). Therefore the distributional effects of the APFD seem to be less substantial than models that combine a basic payment with significant income tax changes (ibid).

Nevertheless, the initiative has maintained a high level of popularity amongst the Alaskan population since its inception, with a majority of Alaskans continuing to support the payment and almost 80 per cent of the population agreeing that the dividend is an important source of income for people in their local community (Knapp et al. 1984) (ESP 2017). The dividend amount is subject to change and is delivered annually meaning that it would not be considered a basic income scheme by the two core definitions discussed above. Yet, with payments being unconditional and universal, if not regular, the APFD represents one of the closest and most consistent real-world examples that can be drawn on for those interested in basic income design and implementation.

- First Nation payments

The APFD is not the only example of a dividend-based community payment. Basic payments are also made as a proportion of casino profits to members of approximately 120 First Nation reservations, a trend that begun in the late 1980s following the introduction US Indian Gaming Regulatory Act (IGRA) that allowed such nations to operate gambling businesses (Gibson et al. 2018). Although these per capita dividends are non-universal within the context of the wider state, they are paid universally to First Nations peoples, and are permanent and unconditional. In many cases, the level of dividend is enough to maintain a basic level of subsistence without other sources of income (ibid).

The Second Wave (2008-Present)

In the aftermath of the financial crash and increasing contraction in welfare state spending across the globe, and with the prospect of technological change across the economy, the case for basic income schemes has been raised anew. Completed pilots and related studies of forms of basic payment schemes have taken place in Namibia (2008-2009), Madhya Pradesh in India (2011-2013) and, most recently, Finland (2017-2018). Popular advocates in the modern context have championed the ability of basic income initiatives to address poverty (Lowrey 2018), create a fairer work-life balance (Bregman 2017), combat the increasing threat of automation (Srnicek and Williams 2016) and contribute to a more socially just tax system (Murphy 2015).

- Namibian Basic Income Grant – 2008-2009

The Namibian Basic Income Grant Pilot (2008-2009) was designed, at least in part, with the aim of redistribution agenda in mind given high rates of poverty, high unemployment, and high inequality within the country at the time (Haarmann, Haarmann & Nattrass, 2019). For Rigmar Osterkamp (2013), the need to address inequality through the initiative was particular warranted given Namibia's status as a "middle-income economy" with some of the highest historical levels of income-inequality in the world.

The pilot was funded by a combination of foundations and individual donations with the express intention of convincing the government to adopt the scheme at a national level (Standing 2017) (Osterkamp 2013). Selection was based largely on the mutual impoverishment of the 1005 residents of the town of Otjivero who had "no access to land and limited access to jobs" (Haarmann, Haarmann & Nattrass, 2019). Other notable factors in the selection of recipients included an exclusion of individuals over the age of 60 (receiving a state pension) and the fact that children received the basic income via their mothers, not fathers (Osterkamp 2013). Recipients, including all children, received "an unconditional

monthly basic income of 100 Namibian dollars (about $8, and about 2 percent of Namibia's GDP per capita at the time)" (Van Parijs & Vanderborght 2017). The pilot was officially concluded after two years, although payments to participant continued at a reduced rate until 2014 (Haarmann, Haarmann & Nattrass, 2019).

The impact of the Namibian Basic Income Grant was assessed during the pilot via three field surveys. These were conducted in November 2007 (the baseline survey), in July 2008 (a first assessment after half a year) and in November 2008 (covering 11 months of payments) (Osterkamp 2013). Those who designed the pilot pointed to several positive indicators recorded through the surveys. Child malnutrition fell significantly during the pilot, with a baseline rate of 42% at the start of the project dropping to 17% in July 2008 and 10% in November 2008 (Haarmann, Haarmann & Nattrass, 2019). Due to a noted increase in average household income, payment of school fees more than doubled (to 90%) and non-attendance at school fell by 42% (ibid). Petty crime rates also dropped during the pilot and a small growth in business activity and labour market participation was also recorded.

The causal relationship between the pilot and these outcomes has been called into question. Critics point to the fact that the baseline sample size was not sufficient, the surveyors were involved in the design of the project and where non-neutral and that data was not published on an open-access basis as is standard practice for such pilots (Osterkamp 2013). The primary criticism, however, was that other government interventions (including food aid provided at the start of the project) may have contributed to the outcomes to a greater degree than the BIG payments (ibid). The lack of a control group in terms of the project makes it difficult to isolate the effects of the BIG payments directly. The ultimate aim of the project was unsuccessful, with the Namibian government unwilling to adopt the policy on a national basis and there are currently no further plans to conduct further pilots in the country.

- Madhya Pradesh in India – 2011-2013

Like the Namibian pilot, the funding for the Madhya Pradesh pilots was sourced from non-governmental bodies through the United Nations Development Programme and then, more substantially, from the United Nations children's fund UNICEF (Standing 2017). In the case of the Madhya Pradesh pilots, such extra-governmental funding underlined the initiatives' aim to provide a viable alternative to poorly implemented welfare schemes (Davala 2019).

For some, the pilots' design constitutes the most robust attempt to test as many characteristics of a full basic income as possible (Berain Garza 2018). All citizens included within the areas tested were beneficiaries on an unconditional basis, with around 6000 people receiving basic income payments (Davala 2019) (Berain Garza 2018). For the first 12 months of the pilots, adult residents received a basic income of "200 rupees per month

(slightly more than $4, or 6.5 percent of GDP per capita in Madhya Pradesh and 4 percent of GDP per capita in India at the time)", with children receiving 50% of the entitlement (Van Parijs & Vanderborght 2017). For the remaining five months of the program, payments were increased to 300 and 150 rupees for adults and children respectively (Gibson et al. 2018). A separate study, specifically of tribal groups in the region, was also deemed appropriate, with individuals in these communities receiving the larger of the two payments for the entire 12-month durations of the pilot (Davala 2019).

The Madhya Pradesh pilots benefitted from the use of a modified Randomised Control Trial (RCT) methodology, with participants assigned on a communal rather than individual basis to correct for ethical concerns (Davala 2019). The main pilot was conducted in eight villages, with 12 villages in the region receiving no basic income support. In terms of the tribal villages, individuals in one received basic income payments whilst one other did not (ibid).

This methodology allowed a more precise estimation of the impacts of the pilot than was the case in the Namibian example. Several positive outcomes were noted in the case of the general and tribal pilots. As was the case in the Namibian pilot, the most significant of these related to an improvement in nutrition amongst both adult and child beneficiaries (ibid). Other health benefits included an increased ability to afford regular medication and an increasing ability to access a range of health services. This also resulted in households becoming more financially resilient, with individuals experiencing less pressure to enter into destructive cycles of debt (ibid). Finally, "productive work" amongst beneficiaries was seen to increase, with many choosing to invest in their own private enterprises such as farm holdings and other small businesses (ibid) (Gibson et al. 2018).

- Finland – 2017-18

Finland's pilot of a basic income was primarily concerned with addressing the country's high historical rates of unemployment following an economic recession in the early 1990s (De Wispelaere, Halmetoja & Pulkka 2019). Specifically, the centre-right government's intention when designing the program was to explore ways in which the social security system could be reshaped to "better adjust to changes in working life, to make social security more participatory, to diminish disincentives to working, to reduce bureaucracy and to simplify the overly complex tax-benefit system" (Kangas, Simanainen & Honkanen 2017).

The Finish model narrowed the pool of recipients through their targeting of the unemployed, and made payments to 2000 individuals between 25 and 58 years of age who received a basic daily allowance or labour market support as of November 2016 (ibid). The Finnish trial was unique, however, in that it was the "first Basic Income experiment to adopt a nation-wide RCT design" (De Wispelaere, Halmetoja & Pulkka 2019). Although targeted in terms of

the characteristics of recipients, the trial was strengthened by casting a wider net amongst the Finish population allowing greater analysis of, for example, differences between urban and rural groups.

A flat payment of €560 per month was provided, tax free to 2000 people registered unemployed (Standing 2017). Despite the recommendations of a research group involved in the design of the pilot, the decision was made by the government to work on a single model of basic income corresponding to "the basic level received by those on labour market subsidy and basic unemployment benefit" (De Wispelaere, Halmetoja & Pulkka 2019).

The preliminary results of the Finish basic income experiment did not produce any statistically significant improvements in employment outcomes and therefore did not achieve its overarching goal (Kangas et. al 2019). Recipients did, however, report clear improvements in their overall wellbeing. Additionally, it has been suggested that the data generated through the evaluation of the program can be used to redesign the current social security system, which may lead to impacts in terms of social security reforms if not basic income implementation (ibid). Proponents of basic income have been quick to defend the concept in light of the Finnish results. In particular, the poor design of the Finnish model has been cited as a potential cause of the weak results, with inadequate funding and a rushed process cited as key flaws (Bendix 2019).

Annex B: Elasticities used in estimation of labour supply responses

Table B1: Elasticities with respect to the gain-to-work used to estimate the substitution effect on the extensive margin, for those aged 19-54 (low scenario)

		Position in UK earnings distribution					
		Lowest-earning 20%	Next 20%	Middle-earning 20%	Next 20%	Highest-earning 20%	Average
Men (except lone fathers)		0.04	0.045	0.037	0.027	0.015	0.032
Single women without children		0.053	0.059	0.048	0.035	0.019	0.049
Women without children, non-working partner		0.025	0.038	0.036	0.028	0.017	0.031
Women without children, working partner		0.05	0.065	0.056	0.042	0.024	0.052
Lone parents, youngest child aged:	0–2	0.18	0.219	0.172	0.137	0.081	0.175
	3–5	0.228	0.265	0.239	0.242	0.242	0.242
	6–10	0.161	0.19	0.163	0.142	0.081	0.159
	11+	0.122	0.126	0.116	0.091	0.058	0.112
Women with non-working partner, youngest child aged:	0–2	0.034	0.035	0.036	0.035	0.035	0.035
	3–5	0.048	0.045	0.044	0.039	0.045	0.045
	6–10	0.035	0.039	0.035	0.031	0.023	0.034
	11+	0.027	0.028	0.021	0.025	0.025	0.025
Women with working partner, youngest child aged:	0–2	0.06	0.087	0.081	0.064	0.038	0.069
	3–5	0.076	0.107	0.104	0.084	0.052	0.087
	6–10	0.058	0.081	0.078	0.063	0.038	0.064
	11+	0.044	0.056	0.055	0.043	0.025	0.047
Average		0.061	0.062	0.049	0.037	0.02	0.048

Table B2: Elasticities with respect to the gain-to-work used to estimate the substitution effect on the extensive margin, for those aged 19-54 (high scenario)

		Position in UK earnings distribution					
		Lowest-earning 20%	Next 20%	Middle-earning 20%	Next 20%	Highest-earning 20%	Average
Men (except lone fathers)		0.112	0.127	0.102	0.075	0.043	0.091
Single women without children		0.187	0.207	0.168	0.123	0.067	0.17
Women without children, non-working partner		0.069	0.106	0.101	0.078	0.047	0.086
Women without children, working partner		0.14	0.183	0.157	0.119	0.066	0.145
Lone parents, youngest child aged:	0–2	0.63	0.768	0.604	0.48	0.285	0.611
	3–5	0.797	0.926	0.835	0.846	0.846	0.846
	6–10	0.563	0.664	0.569	0.499	0.284	0.558
	11+	0.419	0.436	0.397	0.293	0.193	0.382
Women with non-working partner, youngest child aged:	0–2	0.12	0.122	0.122	0.127	0.122	0.122
	3–5	0.169	0.156	0.155	0.137	0.156	0.156
	6–10	0.123	0.138	0.123	0.11	0.082	0.119
	11+	0.086	0.094	0.098	0.072	0.087	0.087
Women with working partner, youngest child aged:	0–2	0.211	0.306	0.284	0.223	0.133	0.243
	3–5	0.267	0.376	0.362	0.293	0.181	0.305
	6–10	0.201	0.282	0.274	0.221	0.134	0.224
	11+	0.152	0.198	0.192	0.151	0.088	0.165
Average		0.201	0.192	0.15	0.113	0.06	0.151

Table B3: Elasticities with respect to the gain-to-work used to estimate the substitution effect on the extensive margin, for those aged 19-54 (central scenario)

		Position in UK earnings distribution					
		Lowest-earning 20%	Next 20%	Middle-earning 20%	Next 20%	Highest-earning 20%	Average
Men (except lone fathers)		0.08	0.09	0.073	0.053	0.031	0.065
Single women without children		0.107	0.118	0.096	0.071	0.038	0.097
Women without children, non-working partner		0.049	0.076	0.072	0.056	0.034	0.061
Women without children, working partner		0.1	0.131	0.112	0.085	0.047	0.104
Lone parents, youngest child aged:	0–2	0.36	0.439	0.345	0.274	0.163	0.349
	3–5	0.455	0.529	0.477	0.483	0.483	0.483
	6–10	0.322	0.379	0.325	0.285	0.162	0.319
	11+	0.244	0.253	0.231	0.182	0.117	0.225
Women with non-working partner, youngest child aged:	0–2	0.069	0.07	0.07	0.073	0.07	0.07
	3–5	0.096	0.089	0.088	0.078	0.089	0.089
	6–10	0.07	0.079	0.07	0.063	0.047	0.068
	11+	0.049	0.054	0.056	0.041	0.05	0.05
Women with working partner, youngest child aged:	0–2	0.121	0.175	0.162	0.128	0.076	0.139
	3–5	0.152	0.215	0.207	0.167	0.103	0.174
	6–10	0.115	0.161	0.157	0.126	0.077	0.128
	11+	0.087	0.113	0.11	0.086	0.05	0.094
Average		0.123	0.124	0.098	0.074	0.04	0.096

Table B4: Elasticities with respect to the gain-to-work used to estimate the substitution effect on the extensive margin, for those aged 55+

	Lowest-earning 20%	Next 20%	Middle-earning 20%	Next 20%	Highest-earning 20%	Average
Central	0.177	0.165	0.141	0.118	0.094	0.146
Low	0.353	0.33	0.283	0.235	0.188	0.292
High	0.618	0.577	0.494	0.412	0.33	0.512

Table B5: Elasticities used to estimate the substitution effect on the intensive margin

	Low	Central	High
Those in top 1% of UK earnings distribution	0.1	0.3	0.4
Those in next 4% of UK earnings distribution	0.07	0.2	0.3
Otherwise:			
Men	0.012	0.12	0.24
Single women without children	0.012	0.12	0.24
Women in couples without children	0.057	0.17	0.34
Women with a child aged 0–2	0.067	0.2	0.4
Women whose youngest child is aged 3–5	0.133	0.4	0.8
Women whose youngest child is aged 6–10	0.1	0.3	0.6
Women whose youngest child is aged 11+	0.067	0.2	0.4
Average	0.038	0.16	0.32

Table B6: Elasticities used to estimate income effects

		Low	Central	High
Men and women without children		-0.037	-0.075	-0.15
Women with youngest child aged:	0-2	-0.075	-0.15	-0.3
	3-5	-0.06	-0.12	-0.24
	6-10	-0.05	-0.1	-0.2
	11+	-0.045	-0.09	-0.18

Annex C: Wage bargaining and migration behaviour under conventional bargaining and the social wage

The idea that transactors may look beyond their real net take home wage can be applied to migrants. Rational migrants would certainly wish to include all of the effects of a move on their income levels, including the CBI payments to themselves and their families. We can capture this idea in the following equation. The migration model becomes:

$$m = \varsigma - 0.08\left[\ln(u^S) - \ln(u^R)\right] + 0.06\left[\ln\left(\frac{w^S}{cpi^S}\right) - \beta\ln(1-\tau) - \ln\left(\frac{w^R}{cpi^R}\right)\right] \quad (1)$$

In equation (2): *m* is net in-migration as a proportion of the Scottish population; u is the unemployment rate; the S and R superscripts stand for Scotland and the Rest of the UK, respectively; and ς is a parameter calibrated to generate zero net migration in the base period. β is the parameter indicating the extent to which households value public and CBI-linked private, as against general private, consumption. It represents the subjective net valuation by households of the benefits of the increased CBI weighed against the corresponding increase in their income tax. If β=1 migrants respond to the gross real wage; the rise in tax does not impact their migration decision since they feel as well off after the change as before. They value the benefits of the CBI as much as their loss of real take home pay.

In the social wage case workers value the reduction in poverty and inequality (and the financial value of the CBI to them) as much as their loss of disposable income, and so do not seek to restore the real value of their take home pay, in contrast to the assumption of the conventional bargaining model that all that matters is the net real wage. In this case the real wage curve is augmented for the value attached to the CBI:

$$\ln\left(\frac{w^S}{cpi^S}\right) = c - 0.113\ln\left(u^S\right) + \alpha\beta\ln\left(1-\tau\right) \quad (2)$$

Note that we can, in principle, vary the workers' valuation of the benefits of the CBI, for example, to reflect only the private financial benefits of the CBI to workers. However, for simplicity we focus on the social wage case here, where the combined valuation of private and social benefits of the CBI mean that workers feel no worse off after its introduction, so that there is no wage push response. The parameter α represents the extent to which the amenity effect associated with redistribution (and the private valuation of the CBI) is reflected in the wage bargain and *c* is a calibrated parameter.[49] In the conventional bargaining model

[49] A wage curve elasticity of around -0.1 has been found over a large number of empirical studies across different countries and time periods (Blanchflower and Oswald, 2005).

employed in Section 4 above both α and β equal zero so that the last term on the RHS of (1) is zero. In this case bargaining is over the real net of tax consumption wage (which is the wage on the LHS above). However, in the Social Wage case $\beta=\alpha=1$, so that (2) implies that workers bargain over the pre-tax real wage: the tax hike has no impact on the bargained wage; workers feel as well off after the introduction of the CBI as before.

Annex D: A note on the specification of the CGE model

Technical details of the specification of our models are available in the numerous papers published in professional, international refereed journals (for example, in Lecca et al, 2013, 2014).

Model specification

The model typically has 18 sectors, but these are periodically aggregated to facilitate ease of presentation of results, for example, into Primary, Manufacturing and Services. No sectors are considered 'sheltered', since even health care services, traditionally regarded as a sheltered sector, is now inter-regionally traded.

The model includes three domestic institutional sectors: Firms, Households and Government. External institutions are split into the Rest of UK (RUK) and Rest of the World (ROW).

Consistent with other models, Scotland is assumed to be too small to affect prices in international and interregional markets and, as a consequence, the RUK and ROW prices are taken to be exogenous.

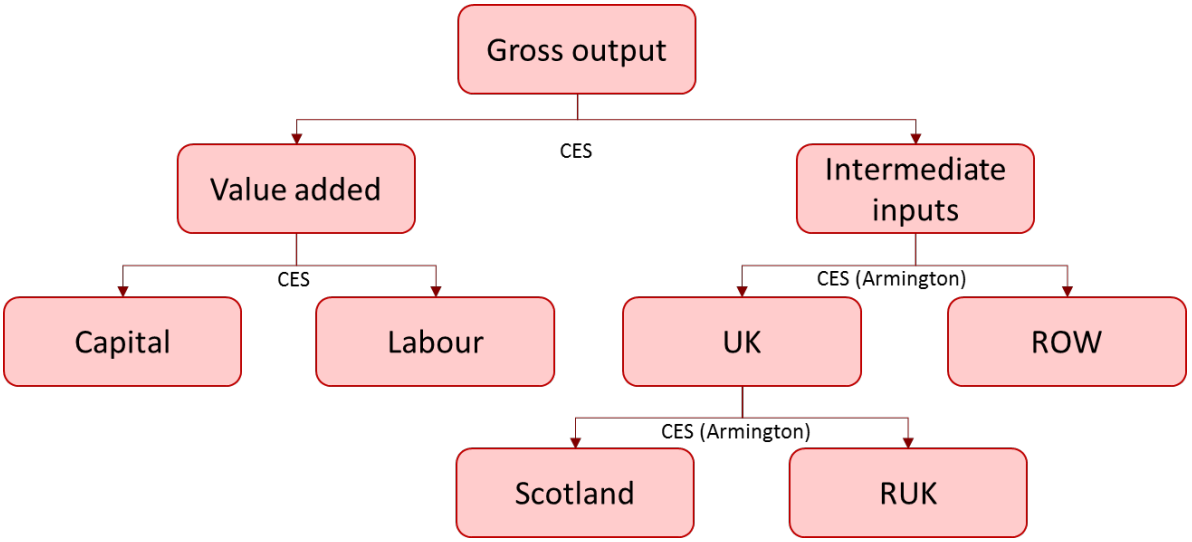
The intertemporal behaviour of Households and Firms is determined either under forward-looking – based on intertemporal optimization with perfect foresight – or myopic assumptions.

The model solution identifies the set of prices at which excess demand is zero in each market and market clearing prices equal marginal costs in each sector. However, imperfect competition in the labour market is accommodated and unemployment is involuntary.

Production

The SPF model has a multilevel, nested production structure, shown in Figure A2.1.

Figure 1: The nested production function



In each sector gross output is produced by combining intermediate inputs, and value added. Labour and capital are combined in order to produce value added. Typically we use CES production functions which allow for a degree of substitution among factors of production. The demand for capital and labour is obtained from the first order condition for profit maximization. This implies that the demand for both factors of production is positively related to the volume of value added and is a decreasing function of their prices.

Each industry in the region produces goods and services that can be exported or sold in the regional market. Intermediate goods that are produced locally (in Scotland) or imported are considered as imperfect substitutes. Scottish goods mix regional and imported goods under the Armington assumptions through a CES function (Figure 1). The demand function for regionally produced and imported intermediate inputs (from RUK and ROW) derives from the solution of a cost minimization problem.

Investment

Capital stock adjustment follows the standard law of motion including investment and depreciation. Investment follows Hayashy (1982), Go (1994) and Devarajan and Go (1998). There are adjustment costs which means that the economy does not adjust instantaneously to the desired level of capital stock. Firms respond to a shock by making continuous small investments over time.

The dynamic path of investment can be determined either under the perfect foresight, forward-looking or myopic assumptions.

Under the forward-looking assumption the dynamic path of investment is the result of an intertemporal programme that seeks to maximize the value of the firm, subject to the capital

accumulation equation. The value of firms is determined by the present value of the capital income less investment expenditure..

Under the myopic assumption investment demand in each sector is a proportion (speed of adjustment) of the difference between actual and desired capital stocks. Desired capital stock is derived from cost minimisation of output and is a function of value added and the price of value added relative to the user cost of capital.

Investment goods can be produced domestically (in Scotland) and be imported (from RUK and ROW). Within each period the distribution between domestically produced and imported investment goods is determined by an Armington CES function in the same way as with intermediate inputs (Figure 1). The demand function for regionally produced and imported investment goods (from RUK and ROW) is derived from the solution of a cost minimization problem.

Consumption

Consumption, like investment, is determined in accordance with either a forward-looking or myopic context.

Under the forward-looking assumption individuals optimise their lifetime utility function of consumption, *C,* subject to a lifetime wealth constraint. According to the dynamic budget constraint, the discounted present value of consumption must not exceed total household wealth. The model distinguishes between financial wealth and non-financial wealth. Solving optimisation problem determines time path of aggregate consumption.

In contrast, under myopic expectations, aggregate consumption is calculated as simple function of income (marginal propensity to consume).

Once the dynamic consumption path is obtained, aggregate consumption is allocated within each period between different goods and services through a CES function. Household demand for regional and imported goods is derived from an intra-temporal cost minimization problem. As explained earlier, all international trade in the SPF model uses Armington assumptions, whereby imports, domestic production, RUK and ROW imports are considered imperfect substitutes. This means that household final demands follow the hierarchical structure of the intermediate inputs branch in Figure 1, and so governs how the SPF model treats all combinations of regional, national (UK), and ROW inputs.

It is possible to disaggregate households into five income groups. In the default SPF model, each household group behaves identically (in a mathematical sense), but data-driven parameterisation results in heterogeneity. Each household group makes its own aggregate

consumption decision based on a specific budget constraint. Distributional effects in simulations can come from two sources: differences in the composition of income and in the sectoral composition of consumption.

Government

Following the Smith Commission and the devolution of income tax and assignment of part of Value-Add Tax (VAT) revenues, this iteration of the SPF model incorporates revenue from devolved (and assigned) tax changes and a distinct Scottish Government, which is subject to an appropriately formulated budget constraint. (UK government expenditures in Scotland are also incorporated.).

Government is split into two levels: UK Government in Scotland and "Scottish Government" (both local and sub-national).

In this regard, the Scottish Budget is made up of a combination of block grant, block grant adjustment and devolved and assigned revenues from Scottish taxes. The model also includes UK Government taxes raised in Scotland (such as business taxes), but these, of course, do not form part of the Scottish Government's budget constraint.

The UK Government in Scotland is assumed to be exogenous, and so its behaviour does not respond to changes in Scottish prices, government revenues, or the behaviour of the Scottish Government. Its transfers (e.g., welfare payments) are indexed to UK prices. Since these are exogenous to Scotland the transfers are effectively fixed in nominal terms. It is assumed the UK government's consumption is fixed in real-terms, i.e. total expenditure changes with changes in the UK price level.

It is useful to be able to simulate the model under a range of alternative treatments of the Scottish Government's budget constraint, so that it can be used to compare results under varying degrees of regional autonomy.

- Fixed government expenditure – a useful benchmark case which treats Scottish Government expenditure symmetrically with the UK Government so that it is fixed in real terms.
- "Barnett case" – fixes Scottish Government revenue in nominal terms (or, to UK prices) through a single block grant.

- "Smith case" – all of income tax and half of VAT revenues are recycled to augment Scottish Government public spending, subject to block grant adjustments. The block grant adjustments can be modified to reflect alternative adjustment mechanisms.[50]
- "Full fiscal autonomy case" – all taxes raised in Scotland are devolved and recycled to augment current public spending by the Scottish Government.

All taxes in the model can be separated into several categories depending on the tax base and application mechanism. There are four categories of taxes:

- Taxes on income, including income tax (earnings and pensions), national insurance contributions (employer and employee), other household taxes – applied to different categories of income;
- Consumption taxes, including value added tax (VAT) and other consumption taxes – applied to different components of final demand. VAT is levied directly on household and government consumption. VAT rates are sector- and final-demand-component-specific. For those sectors where VAT is levied on intermediate consumption , an assumption is made that these costs are passed on to consumers;
- Taxes on capital, including corporation tax – applied profits;
- Taxes on production – indirect taxes applied on value of output.

All potential government revenue sources identified in the Scottish Government Expenditure and Revenue Scotland (GERS) publication have been identified and compared to our modelling assumptions.

Most other taxes, particularly those which are not devolved, are endogenous, but modelled generally through indexing to the appropriate metric. These include taxes such as income tax on dividends, specific purchase taxes, TV license fee, and council tax.

Foreign and public assets

Since Scotland is a region and not an independent country we do not impose strict constraints on accumulation of foreign and public debt, because interregional transfers can sustain perpetual capital flows. At the same time we can track implied foreign and public deficits and debts and impose sustainability constraints if required.

[50] For detailed discussion of new Fiscal Framework and block grant adjustments see Eiser (2017)

Labour market regimes and labour supply

The model incorporates three labour market closures reflecting the form of wage setting: regional wage bargaining (RB); national bargaining (NB); and fixed real wage (FRW).

In the RB regime, the labour market is defined by the wage curve (Blanchflower and Oswald, 1994) according to which wages and unemployment are negatively related. Thus regional wages are directly related to workers' bargaining power and respond to excess demand for labour.

NB is a typical Keynesian closure for regional labour markets. It assumes that the nominal wage is fixed at the base year level. This could be motivated by a system in which the nominal wage is fixed at the national level by the presence of a nation-wide bargaining system (Harrigan et al., 1991).

FRW is used to obtain an alternative counterfactual analysis, reflecting a "real-wage-resistance" hypothesis, where bargaining ensures that the purchasing power of wages remains stable over time.

There are two ways to deal with population change in the model. The first is endogenous adjustment in the labour force through a migration function (Harrigan et al. ,1996; McGregor at al., 1996). The migration model assumes the form specified in Layard et al. (1991) and Treyz et al. (1993) where the net migration flow is taken to be positively related to the gap between the log of regional and national real wages, and negatively related to the difference between the log of regional and national unemployment rates.

Alternatively we can introduce exogenous change in labour supply as a shock into the model and track the model's response to this disturbance.

It is possible to disaggregate the labour market into skilled and unskilled components. In this case there are two types of labour which are imperfect substitutes in the production process. Skill disaggregation is usually combined with the regional bargaining closure, and allows for separate wage curves and migration functions for both skilled and unskilled labour. Skilled and unskilled workers bargain for distinct wages, and the model allows firms to substitute skilled and unskilled workers in response.

Verification process

The development of a CGE model occurs in a number of steps: model specification; data base development (SAM); parameterisation; solution and counterfactual simulations. At each of these stages there are various means of verifying the model.

Once a balanced SAM is generated and the key parameters, including all elasticities of substitution and demand, have been determined, the remaining parameters are calibrated to the base year SAM. Once the calibration process is complete, it is checked by confirming that, when the model is solved with no changes in policy or other variables, it reproduces the base year data.

Homogeneity tests which check that uniform external price changes have no real consequences, are also used in verification. However, there may well be genuine nominal rigidities in the system, which can, for example, emerge as a result of asymmetric revenue (e.g., the partial devolution of taxes) and expenditure devolution (e.g., the indexing of non-devolved versus devolved transfer payments). Necessarily, only versions of the model that have no nominal rigidities pass the homogeneity test.

The solver(s) used are now standard for solving large sets of non-linear simultaneous equations systems. The solutions – and the efficiency of the solver – can be checked through extensive simulation.

Once fully parameterised, the model can be used to simulate the impact of a huge range of demand- and supply-side disturbances, including government policies. There are a number of test simulations where the properties of the solution are known and can be checked. To reflect uncertainty around key parameter values, sensitivity analyses can be conducted. Where this is based on econometrically estimated parameters, statistical information can be used to inform the sensitivity analysis. Where there is genuine uncertainty concerning the appropriate specification of a key behavioural relationship, the sensitivity analysis can be extended beyond parametric sensitivity.

Annex E: The direct impact of benefits on bargaining/ labour supply

Benefits as a stimulus to labour bargaining power

The traditional view is that welfare benefits enhance workers bargaining power and provide a disincentive to work.[51] Nickell (1997) found a significant positive relationship between the generosity of benefits and the rate of unemployment across 20 OECD countries. Furthermore, the detrimental effect of benefits was one of the more consistent results in the literature (OECD, 1996; Layard et al., 2005). The empirical evidence was therefore widely regarded as supporting the "adverse supply" impact of increased benefits, although the focus was predominantly – if not exclusively – on unemployment benefits. Eligibility for CBI, in contrast to unemployment benefits, is not conditional upon labour market status. Nevertheless, here we proceed on the assumption that evidence on the impact of unemployment benefits is applicable to the impact of benefits more generally,[52] and illustrate the potential impact of the CBI based primarily on evidence relating to the impact of unemployment benefits.

Here we use Nickell's (1997) analysis as representative of those studies that find increased benefits have an adverse supply side impact. Nickell (1997) finds that the replacement ratio (of benefits to wages) has a positive impact on the unemployment rate. We then combine this elasticity with a measure of the impact of the CBI on the replacement rate to obtain an estimate of the resultant shift in the real wage curve. Of course, the shift implies upward pressure on wages and the unemployment rate.[53]

Given that we are here dealing with a substantial CBI, which is in fact paid irrespective of labour market status, the results should be regarded as illustrative. Table E.1 presents the short and long run results of a 0.08% increase in the bargaining power of workers. The scale of the shift is so modest that the macroeconomic impacts prove to be negligible.

[51] Micro–level studies have found evidence supporting the disincentive effect (e.g. Lalive, 2007; Card et al., 2015).

[52] In fact, Biegart (2017) tests separately for the impact of minimum income benefits but finds not statistically significant impact on unemployment.

[53] To calculate this shock we calculate the change in UK replacement rate to be 7.59%. This change multiplied by the Nickell (1997) coefficient (-0.011) gives a shock of -0.08%.

Table E.1. Short and long run impacts of increase in bargaining power of workers

	SR	LR
GDP (£m)	-0.007%	-0.016%
Consumption	0.003%	-0.003%
Investment	-0.023%	-0.015%
Total Exports	-0.010%	-0.022%
Total Imports	0.001%	0.000%
Nominal Gross Wage	0.030%	0.025%
Real take home wage	0.025%	0.017%
CPI	0.005%	0.008%
Real cost of capital	0.004%	0.006%
Unemployment Rate (pp difference)	0.013%	0.017%
Employment	-0.013%	-0.018%
Total HH Tax	0.013%	0.004%
Income Tax	0.017%	0.007%
Transfers to HH from Gov	0.000%	0.000%
Real Scottish Government Consumption	0.000%	0.000%
HG1 (Lowest) Consumption	-0.001%	-0.005%
HG2 Consumption	0.000%	-0.005%
HG3 Consumption	0.003%	-0.004%
HG4 Consumption	0.006%	-0.002%
HG5 (Highest) Consumption	0.005%	-0.003%

Not surprisingly, the increased wage pressure immediately pushes up wages and prices and the unemployment rate. In the short-run there is a contraction in economic activity and in employment (by 0.007% and 0.013% respectively), reflecting the reduction in competitiveness, but consumption actually increases, with the stimulus to real wages over this interval (0.025%) dominating the fall in employment (0.013%). However, the responsiveness of labour demand to the wage rise, and the scale of the contraction, increases over the long-run as capacity contracts, and employment falls further (by 0.018%). In the long-run GDP falls by 0.016%, as does consumption (by 0.003%). Exports ultimately fall (by 0.022%) reflecting reduced competitiveness. The distributional effects are, of course, also negligible, but mildly regressive, as we would expect.

Benefits as a subsidy to search activity

Some have argued that generous benefits can *reduce* unemployment by acting as a subsidy to job search (Gangl, 2004, 2006; Nelson and Stephens, 2012; Biegert, 2017). Biegart (2017) argues that

the impact of increased benefits is likely in general to vary with labour market institutions and, in particular, that the weaker is the bargaining power of "insiders" (those in employment, particularly those on permanent contracts) and the greater availability of employment opportunities, the more likely it is that increased benefits may *reduce* unemployment in the long-run. In these circumstances outsiders (who may be unemployed or precariously employed, for example, on zero hours contracts) are enabled by enhanced benefits to search the labour market more extensively and secure better (higher productivity, higher wage) employment. In fact, Biegart (2017) finds a negative long-run association between the level of unemployment benefits and the rate of unemployment.

We also explore the impact of benefits by using an estimate of the coefficient of the level of benefits on the unemployment rate taken from Biegert (2017). Here the coefficient implies a positive supply shock to the bargaining function, reducing workers bargained wage at any given rate of unemployment.[54] This implies a 0.08% fall in the bargaining function at any given unemployment rate.[55]

The results should be regarded as indicative, given the qualifications around the parameter estimates reported by Biegert (2017). Not surprisingly, however, the qualitative results are exactly the opposite of those associated with the traditional bargaining view: there is a stimulus to economic activity and employment that increases in scale in the long-run as capacity adjusts. However, the scale is again very modest, with GDP increasing by 0.16% and employment by 0.18% in the long-run.

[54] This could be accompanied by an increase in productivity, but we consider this separately in the next section.

[55] Similar to the previous bargaining power case the change unemployment rate (7.59%) is multiplied by the Beigret coefficient (0.011).

Table E.2 Short and long run impacts of increase in bargaining power of workers

	SR	LR
GDP (£m)	0.007%	0.016%
Consumption	-0.003%	0.003%
Investment	0.023%	0.015%
Total Exports	0.010%	0.022%
Total Imports	-0.001%	0.000%
Nominal Gross Wage	-0.030%	-0.025%
Real take home wage	-0.025%	-0.017%
CPI	-0.005%	-0.008%
Real cost of capital	-0.004%	-0.006%
Unemployment Rate (pp difference)	-0.013%	-0.017%
Employment	0.013%	0.018%
Total HH Tax	-0.013%	-0.004%
Income Tax	-0.017%	-0.007%
Transfers to HH from Gov	0.000%	0.000%
Real Scottish Government Consumption	0.000%	0.000%
HG1 (Lowest) Consumption	0.001%	0.005%
HG2 Consumption	0.000%	0.005%
HG3 Consumption	-0.003%	0.004%
HG4 Consumption	-0.006%	0.002%
HG5 (Highest) Consumption	-0.005%	0.003%

Benefits and the Social Wage

If the Social Wage case holds, there is no rationale for the adverse supply side impact; workers simply accept that they are no worse off after the introduction of the CBI, so there is no wage push effect. However, if the payment of the CBI effectively acts as a subsidy to search (and other) activity (see the discussion of productivity below), this positive supply side impact could be additional to the wage dampening effects of the Social Wage. In these circumstances, the short and long run impacts of the introduction of the CBI would be more likely to be positive, although the estimated "direct" impacts of benefits are extremely small relative to, for example, possible wage responses to the rise in income tax rates.

Summary of the likely direct effects of the CBI on unemployment

The empirical evidence on the direct effects of benefits on unemployment is conflicting. However, it is the case that the strongest evidence in favour of the conventional bargaining view is now rather dated and in any case seems to imply a minimal macroeconomic impact here, whereas that favouring the positive supply shock is more recent. Furthermore, it is the case that union power – and therefore probably the power of insiders – has been experiencing a decline, and other things being equal this would lead us to expect benefits to have a more positive labour market impact. However, the evidence on this remains fairly thin, tends not to extend in a straightforward way to benefits as a whole (rather than unemployment benefits) and again seems to imply negligible change in our analysis. Furthermore, it is not clear whether wage bargaining behaviour may alter as labour markets tighten and opportunities for outsiders to secure gainful employment decline.

Annex F: The macroeconomic impact of a CBI in the presence of a disaggregated labour market

We begin by considering the impact of an income-tax-financed CBI using the skill-disaggregated model, assuming fixed nominal wages (and no migration) for both skill groups.

Fixed nominal wages

Table F.1 summarises the short and long-run impacts of an income-tax-financed CBI, given fixed nominal wages for both skilled and unskilled labour. The results are directly comparable with the results of the fixed nominal wage aggregate model reported in the first two columns of Table 4.3. It is clear that the overall macroeconomic impact of the CBI is basically unaffected by skills disaggregation in this case. For example, GDP, aggregate consumption, investment, exports and imports exhibit the same very slight changes in the skill disaggregated model as in the aggregate model (of 0.1%, 0.00%, 0.46%, 0.00% and -0.01% respectively). The macroeconomic impacts of the increase in the consumption of lower income households continue to be largely cancelled out by the fall in the consumption of higher income households.

Table F.1 Short and long run impacts of an income tax-financed, Policy Option 1 with skill disaggregation. (Fixed nominal wage with no migration)

	SR	LR
GDP (£m)	-0.15%	0.10%
Consumption	-0.13%	0.00%
Investment	0.19%	0.46%
Total Exports	-0.30%	0.00%
Total Imports	-0.08%	-0.01%
CPI	0.06%	0.00%
Transfers to HH from Gov	117.37%	117.37%
Unskilled Unemployment Rate (pp difference)	6.31%	6.18%
Skilled Unemployment Rate (pp difference)	6.28%	6.12%
Unskilled employment	-0.33%	-0.20%
Skilled employment	-0.30%	-0.12%
Unskilled Real Net Wage	-13.10%	-13.06%
Skilled Real Net Wage	-13.10%	-13.06%
HG1 Lowest income group's consumption	30.67%	30.76%
HG2 Second quintile's consumption	15.10%	15.22%
HG3 Third quintile's consumption	3.53%	3.65%
HG4 Fourth quintile's consumption	-6.46%	-6.32%
HG5 Highest income group's consumption	-12.62%	-12.48%

Of course, the skill-disaggregated model does provide information on the impact of the CBI across skill groups. In this case, however, the impacts are extremely modest in scale. In the long-run both skilled and unskilled employment fall by 0.12% and 0.20% respectively. The consumption of low-income households appears to be slightly more skill-intensive than that of high-income households, although the changes here are all very small in scale. The reduction in the real net wage is the same for both skilled and unskilled workers here given that: the nominal wage is fixed; prices ultimately return to their original levels; and the impact of the higher income tax rate for both groups is the same (given that this is represented by changes in the average tax rate in the model).

We find that skill differentiation makes no difference to the aggregate macroeconomic impact of the CBI when nominal wages are inflexible, and there is very little difference in the impacts on the skilled and unskilled groups (with the former faring slightly better than the latter).

Conventional bargaining

The short and long run macroeconomic impacts of an income-tax-financed CBI in the skill-disaggregated variant of the conventional bargaining model are summarised in Table F.2 and Figure F.1. These results are directly comparable to the aggregate results of the conventional bargaining model, which are reported in Table 7 in the text. The most striking feature of the macroeconomic results is how closely they resemble those of the model with the aggregated labour market.

There is a major contraction in GDP and employment, of 8.4% and 9.4% respectively, slightly less than occurs in the aggregate model (8.8% and 9.7%). The skill disaggregation of the labour market provides it with marginally enhanced flexibility, which results in a slightly smaller contraction. The main driver of the macroeconomic outcome here is identical to that in the aggregated model: the substantial fall in real take home pay – here of both skilled and unskilled workers - drives a wage push effect that exerts a very substantial contraction in economic activity.

Table F.2. Short and long run impacts of an income tax-financed, Policy Option 1 with skill disaggregation. (Conventional bargaining with no migration)

	SR	LR
GDP (£m)	-2.56%	-8.44%
Consumption	0.39%	-4.46%
Investment	-7.42%	-7.53%
Total Exports	-3.37%	-10.10%
Total Imports	-0.18%	-1.70%
CPI	1.59%	3.84%
Transfers to HH from Gov	117.37%	117.37%
Unskilled Unemployment Rate (pp difference)	10.72%	15.71%
Skilled Unemployment Rate (pp difference)	10.14%	14.43%
Unskilled employment	-5.02%	-10.33%
Skilled employment	-4.40%	-8.97%
Unskilled Real Net Wage	-6.29%	-10.22%
Skilled Real Net Wage	-6.10%	-10.00%
HG1 Lowest income group's consumption	29.77%	26.85%
HG2 Second quintile's consumption	14.80%	10.90%
HG3 Third quintile's consumption	4.01%	-0.11%
HG4 Fourth quintile's consumption	-5.12%	-10.06%
HG5 Highest income group's consumption	-11.97%	-18.14%

Figure F.1 GDP and skilled and unskilled employment responses to an income-tax-financed, Policy Option 1

Source: Fraser of Allander

The skill-disaggregated model provides additional information on how the CBI-induced contraction in economic activity impacts differentially across skill groups. From the fix wage simulation, it is apparent that the consumption expenditure of lower income groups is slightly relatively skilled intensive and here skilled employment and real net wages ultimately fall by 9.0% and 10.0% respectively, whereas the unskilled labour market is more adversely impacted (employment falls by 10.3% and the real take home wage by 10.2%). The negative macroeconomic impact on the unskilled on employment is much greater than that on the skilled and furthermore, this differential increases with the induced contractions in the capital stock. The scale of the contractions in skilled and unskilled labour demand depends on a whole range of factors, including the: capital and skill intensities of each sector's production; ease of substitution of capital for labour and of skilled for unskilled labour; degree of openness of relevant product markets and the sensitivity of these to changes in competitiveness.

The distributional impacts across households are very similar to those generated by the corresponding aggregate model, but are rather different from those associated with the skill disaggregated model with a fixed nominal wage.

Overall, the disaggregation of skills makes little difference to the estimated macroeconomic impact of an income-tax-funded CBI irrespective of the whether wages are determined in real net of tax terms or through a fixed nominal wage. However, the behaviour of wages continues to have a critical impact on the overall macroeconomic outcome. Under conventional bargaining, with skills disaggregated or aggregated, the key is the resultant substantial

reduction in take home pay of workers, which stimulates a major wage-push effect with adverse impacts on economic activity. Again, a key factor in the macroeconomic impact of a CBI is the extent to which workers can be persuaded that the financial benefits to them and their families, combined with the social benefits of a more equal society, merit a "passive" response (in terms of wage claims) to the introduction of an income-tax-financed CBI.

Sectoral disaggregation

We also explore the impact of allowing for separate labour markets across sectors. The public sector is distinctive in typically having a much more centralised bargaining system than the private sector: unionisation is much higher (with average unionisation rates of 60.8% compared to 14% in the private sector)[56] and bargaining is "as if" with a single employer. Accordingly, we explore the impact of distinctive labour markets for the public and private sectors. The demand for labour is simply obtained for the public and private sectors by summing demands across their constituent sub-sectors. The supply side of each sector's labour market would typically be characterised by distinctive wage bargaining functions (and, as appropriate, sector-specific migration functions). As for the skill case we explore the consequences of sectoral disaggregation for the impacts of the CBI by considering the case where both sectors are characterised either by a fixed nominal wage or a (net of tax) real wage curve. However, here we also allow for a case of asymmetric bargaining across sectors.

Fixed nominal wages

Table F.3 summarises the short and long-run impacts of an income-tax-financed CBI, given fixed nominal wages for both the private and public sectors. The results are directly comparable to the results of the fixed nominal wage aggregate model reported in the first two columns of Table 4.3. It is clear that the overall macroeconomic impact of the CBI is basically unaffected by sectoral disaggregation in this case. For example, GDP, aggregate consumption, investment, exports and imports exhibit the same very slight changes in the sectorally disaggregated model as in the aggregate model (of 0.1%, 0.00%, 0.46%, 0.00% and -0.01% respectively).). The impacts of the increase in the consumption of lower income households continue to be largely cancelled out by the fall in the consumption of higher income households.

[56] Source: authors' calculations from the Labour Force Survey (2016).

Table F.3 Short and long run impacts of an income tax-financed, Policy Option 1 with sectoral disaggregation. (Fixed nominal wage with no migration)

	SR	LR
GDP (£m)	-0.15%	0.10%
Consumption	-0.13%	0.00%
Investment	0.19%	0.46%
Total Exports	-0.30%	0.00%
Total Imports	-0.08%	-0.01%
CPI	0.06%	0.00%
Transfers to HH from Gov	117.37%	117.37%
Public Unemployment Rate *(pp difference)*	6.57%	6.50%
Private Unemployment Rate *(pp difference)*	6.19%	6.01%
Public Employment	-0.61%	-0.53%
Private Employment	-0.20%	-0.01%
Public Real Net Wage	-13.10%	-13.06%
Private Real Net Wage	-13.10%	-13.06%
HG1 Lowest income group's consumption	30.67%	30.76%
HG2 Second quintile's consumption	15.10%	15.22%
HG3 Third quintile's consumption	3.53%	3.65%
HG4 Fourth quintile's consumption	-6.46%	-6.32%
HG5 Highest income group's consumption	-12.62%	-12.48%

Of course, the sectorally disaggregated model does provide information on the impact of the CBI across sectors. In this case, however, the impacts are extremely modest in scale. In the long-run private employment decreases negligibly (0.01%), while public employment falls (by 0.53%). The consumption of low-income households appears to be slightly more private-intensive than that of high-income households, although the changes here are all very small in scale. The reduction in the real net wage is the same for both private and public workers here. Given that the nominal wage is fixed, prices ultimately return to their original levels and the impact of the higher income tax rate for both groups is the same given that this is represented by changes in the average tax rate in the model.

Sectoral differentiation makes no difference to the aggregate macroeconomic impact of the CBI when nominal wages are inflexible.

Conventional bargaining

The short and long run macroeconomic impacts of an income-tax-financed CBI in the sector-disaggregated variant of the conventional bargaining model are summarised in Table F.4 These results are directly comparable to the aggregate results of the conventional bargaining model, which are reported in Table 7 above. The most striking feature of the macroeconomic results is how closely they resemble those of the model with the aggregated labour market. There is a major contraction in GDP and employment, of 8.43% and 9.7% respectively, slightly more than occurs in the aggregate model (8.43% and 9.5%). The sectoral disaggregation of the labour market imposes marginally increased frictions, which result in a slightly larger contraction. The main driver of the macroeconomic outcome here is identical to that in the aggregated model: the substantial fall in real take home pay – here of both public sector and private sector workers - drives a wage push effect that exerts a very substantial contraction in economic activity.

Table F.4 Short and long run impacts of an income tax-financed, Policy Option 1 with sectoral disaggregation.(Bargaining, no migration)

	SR	LR
GDP (£m)	-2.56%	-8.43%
Consumption	0.33%	-4.54%
Investment	-7.33%	-7.48%
Total Exports	-3.33%	-10.02%
Total Imports	-0.20%	-1.72%
CPI	1.61%	3.91%
Transfers to HH from Gov	117.37%	117.37%
Public Unemployment Rate *(pp difference)*	9.10%	10.90%
Private Unemployment Rate *(pp difference)*	10.77%	16.30%
Public Employment	-3.29%	-5.22%
Private Employment	-5.08%	-10.96%
Public Real Net Wage	-4.55%	-6.47%
Private Real Net Wage	-6.78%	-11.30%
HG1 Lowest income group's consumption	29.79%	26.87%
HG2 Second quintile's consumption	14.79%	10.91%
HG3 Third quintile's consumption	4.01%	-0.08%
HG4 Fourth quintile's consumption	-5.13%	-10.02%
HG5 Highest income group's consumption	-12.14%	-18.44%

The sector-disaggregated model does, of course, provide additional information on how the CBI-induced contraction in economic activity impacts differentially across sectors. From the fix wage simulation it is apparent that the consumption expenditure of lower income groups is slightly relatively public sector intensive. However, here public sector employment and real net wages ultimately fall by 5.2% and 6.5% respectively, whereas the private sector labour market is more adversely impacted (employment falls by 11.0% and the real take home wage by 11.3%). The negative macroeconomic impact on the private sector on both employment and the real net wage is much greater than that on the public sector and furthermore, this differential increases with the induced contractions in the capital stock. The scale of the responses to the contractions in public and private sector labour demand depends on a whole range of factors, including the: capital and skill intensities of each sector's production; ease of substitution of capital for labour, the degree of openness of relevant product markets and the sensitivity of these to changes in competitiveness. These last two factors provide the main explanation of the differentiated sectoral impacts; the public sector is sheltered from the adverse competitiveness effects.

The distributional impacts across households are very similar to those generated by the corresponding aggregate model, but are rather different from those associated with the sectorally disaggregated model with a fixed nominal wage.

Overall, the disaggregation by sectors appears to make little difference to the estimated macroeconomic impact of an income-tax-funded CBI irrespective of the whether wages are determined in real net of tax terms or through a fixed nominal wage. However, we have assumed up to now that sectoral wages are modelled in a symmetrical way. We now relax that assumption.

Conventional bargaining in the private sector, social wage in the public sector

Recall that a key distinguishing feature of the public sector is the extent of centralisation of its wage bargaining process relative to the private sector. This suggests the possibility of differentiated bargaining behaviour across sectors: in particular, the conditions in the public sector are more conducive to the introduction of a social wage arrangement. Accordingly, we explore the impact of a social wage within the public sector combined with conventional bargaining in the private sector.[57]

[57] Given the low average union membership rate in the private sector, approximately competitive markets might be assumed instead. The micro-to-macro case assumes universally competitive labour markets.

Table F.5 summarises the results of assuming a social wage in the public sector and conventional bargaining in the private sector.

Table F.5 Short and long run impacts of an income tax-financed, Policy Option 1 with sectoral disaggregation: bargaining in the private sector with social wage in public sector

	SR	LR
GDP (£m)	-1.86%	-5.29%
Consumption	0.26%	-2.80%
Investment	-5.23%	-4.59%
Total Exports	-2.49%	-6.39%
Total Imports	-0.15%	-1.07%
CPI	7.04%	7.69%
Transfers to HH from Gov	-8.16%	-11.17%
Public Unemployment Rate *(pp difference)*	9.47%	12.23%
Private Unemployment Rate *(pp difference)*	9.05%	11.40%
Public Employment	-3.69%	-6.63%
Private Employment	-3.24%	-5.74%
Public Real Net Wage	-17.57%	-22.09%
Private Real Net Wage	-4.54%	-6.99%
HG1 Lowest income group's consumption	30.03%	28.30%
HG2 Second quintile's consumption	14.89%	12.51%
HG3 Third quintile's consumption	3.89%	1.29%
HG4 Fourth quintile's consumption	-5.49%	-8.66%
HG5 Highest income group's consumption	-12.13%	-16.02%

Not surprisingly, the macroeconomic results are intermediate to those reported for the case of universal real net wage bargaining and the social wage (Tables 7 and 8 respectively). In the long run the overall contraction in GDP, at 5.3%, is under half that which occurs under universal bargaining and falls in other aggregate variables are similarly limited.

The sectoral results again reflect the comparative insulation of the public sector from competitiveness changes. However, the presence of the social wage in the public sector now results in its real net wage falling very substantially, by 22.1%, and a 6.6% reduction in public sector employment in the long run. In contrast in the private sector, labour's attempt to restore its pre-tax wage ultimately results in a 6.7% reduction in the real wage and a fall in employment of 5.7%. The separation of the sectoral labour markets creates some tension, at

least with the long-run results; we would expect the large wage differential to stimulate some labour mobility between sectors over the longer term.

Overall, the main message is, again, that the response of wages to the introduction of the CBI has a critical impact on the overall macroeconomic outcome. Under conventional bargaining, with skills or sectoral disaggregation, the key is the resultant substantial reduction in take home pay of workers, which stimulates a major wage-push effect with seriously adverse impacts on economic activity. This can be mitigated if the social wage characterises the behaviour of at least some sectors (here the public sector), and more than wholly offset if the social wage prevails generally.

The example of heterogenous wage determination across public and private sectors does tend to reinforce the importance of persuading labour and labour market institutions of the value of the CBI prior to implementation. The more sectors/ workers/ unions are persuaded to link the CBI and wage determination, the less likely are adverse macroeconomic consequences.

Annex G: A case-study based illustrative micro-to-macro analysis of a CBI-type intervention

Here we provide an illustrative micro-to-macro analysis based on a case study of the Alaskan Permanent fund. Jones and Marinescu (2018) report an increase in part-time employment of 17%, which even if we accept (probably conservatively) that total employment is unaffected, implies an overall decrease in full-time-equivalent labour supply of 12.88%.

Table F.1 reports the macroeconomic impact of such a contraction in labour supply in Scotland, assuming a completely wage-inelastic supply curve. (This effectively maximises the macroeconomic impact, so is of course purely illustrative.)

Table G.1 Alaskan labour supply impacts (wage-inelastic case)

	SR	LR
GDP (£m)	-7.88%	-11.80%
Consumption	3.16%	-2.45%
Investment	-23.41%	-10.75%
Total Exports	-10.72%	-15.93%
Total Imports	0.99%	0.11%
Nominal Gross Wage	34.97%	21.22%
Real take home wage	27.93%	14.07%
CPI	5.51%	6.27%
Real cost of capital	3.95%	4.92%
Unemployment Rate (pp difference)	0.00%	0.00%
Employment	-12.88%	-12.88%
Total HH Tax	12.99%	3.67%
Income Tax	17.59%	5.61%
Transfers to HH from Gov	0.00%	0.00%
Real Scottish Government Consumption	0.00%	0.00%
HG1 Lowest income group's consumption	-1.42%	-3.67%
HG2 Second quintile's consumption	0.18%	-3.81%
HG3 Third quintile's consumption	2.58%	-2.61%
HG4 Fourth quintile's consumption	5.40%	-1.67%
HG5 Highest income group's consumption	4.39%	-2.02%

The significant reduction in labour supply represents an adverse supply shock, which pushes up real wages, reduces competitiveness, exports and investment. In the long run investment falls by 10.8%, GDP by 11.8% and employment by 12.9%, so that there is some substitution away from labour whose real wage is push up substantially (by 14.1% in the long-run). GDP per capita falls by less than GDP: the fall in GDP exceeds that in population.

Table G.2 summarises the results of the same shock, but assuming that labour supply is responsive to the real wage. Again there is a negative impact on economic activity, but here it is reduced: the impacts on employment and the real wage are smaller than under the perfectly wage-inelastic case, as we would expect.

Table G.2 Alaskan labour supply impacts (positive wage elasticity)

	SR	LR
GDP (£m)	-6.62%	-10.75%
Consumption	-2.80%	-5.06%
Investment	-23.97%	-9.82%
Total Exports	-6.85%	-12.66%
Total Imports	-2.15%	-1.72%
Nominal Gross Wage	22.05%	16.27%
Real take home wage	18.50%	10.86%
CPI	2.99%	4.88%
Real cost of capital	3.77%	3.84%
Unemployment Rate (pp difference)	-2.41%	-1.61%
Employment	-10.64%	-11.39%
Total HH Tax	23.25%	13.44%
Income Tax	9.06%	3.03%
Transfers to HH from Gov	0.00%	0.00%
Real Scottish Government Consumption	0.00%	0.00%
HG1 Lowest income group's consumption	-1.35%	-2.94%
HG2 Second quintile's consumption	-1.73%	-3.68%
HG3 Third quintile's consumption	-1.65%	-4.23%
HG4 Fourth quintile's consumption	-1.51%	-4.79%
HG5 Highest income group's consumption	-5.82%	-7.53%

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